Australian Government
Department of Agriculture, Water and the Environment

Live sheep exports to, or through, the Middle East—Northern Hemisphere summer

Regulation impact statement

Live Animal Exports Division, OBPR ID: 23822

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Summary

This regulation impact statement (RIS) has been prepared by the Department of Agriculture, Water and the Environment to analyse the economic benefits and impacts of proposed regulatory options to limit the risk of heat stress in live sheep exported to, or through, the Middle East during the Northern Hemisphere summer, from 1 May to 31 October inclusive. Improving animal welfare outcomes, by reducing the risk of heat stress, will benefit those involved in the supply chain by supporting the sustainability of the live sheep export trade.

The department released the *Live sheep exports to or through the Middle East—Northern Hemisphere summer draft regulation impact statement* (draft RIS) on 20 December 2019 for a 6-week public consultation. The draft RIS sought comments from interested stakeholders on 3 draft policy options. The draft RIS also posed a range of questions relating to the potential benefits and impacts of each option.

The draft RIS received 21 submissions from a range of stakeholders, including:

- animal welfare organisations
- exporters
- general public
- international trading partners
- peak industry and industry-related bodies
- producers
- research organisations and academics
- state and territory governments
- veterinarians.

In addition, over 1,400 RSPCA Australia templated campaign responses were received.

In designing the options set out in this RIS the department considered information from public consultation including submissions to the draft RIS, the Middle East sheep exports policy options discussion paper (discussion paper), the McCarthy Review, the Heat Stress Risk Assessment (HSRA) Review, the mortality rate outcomes under the 2019 Northern Hemisphere summer conditions, voyage reports and independent observer (IO) reports. To further assist in setting the options, the department analysed climatological data supplied by the Bureau of Meteorology (Bureau) for each day of the year from April through to November for the period 1990 to 2018. Environmental data and observations aboard vessels that travelled to the Middle East during May, September and October 2019 and voyage reports from 2018 were also reviewed.

Based on this information, 3 regulatory options are presented:

1) Option 1: maintain the regulatory status quo (pre-2019)

2) Option 2: implement a prohibition on live sheep exports from 1 June to 14 September with additional prohibition periods for Qatar and Oman, combined with additional conditions for the permitted periods between May to October (inclusive)

3) Option 3: Implement a prohibition on live sheep exports from 1 May to 31 October.

A non-regulatory option has not been explored because it would not meet the fundamental expectation of the Australian community for Australian Government regulatory oversight of live animal exports. In addition to seeking to protect animal welfare, regulation of the trade seeks to avoid a major incident that could adversely impact on Australia's trading relationships and economy. Removing or diminishing the role of the Australian Government in the regulation of live animal exports would pose a significant risk to animal welfare, live sheep export industry participants, Australia's trading relationships and regional economies.

This RIS analyses the economic and regulatory benefits and impacts of each policy option. Based on this analysis, the department's preferred option is option 2.

1 Introduction

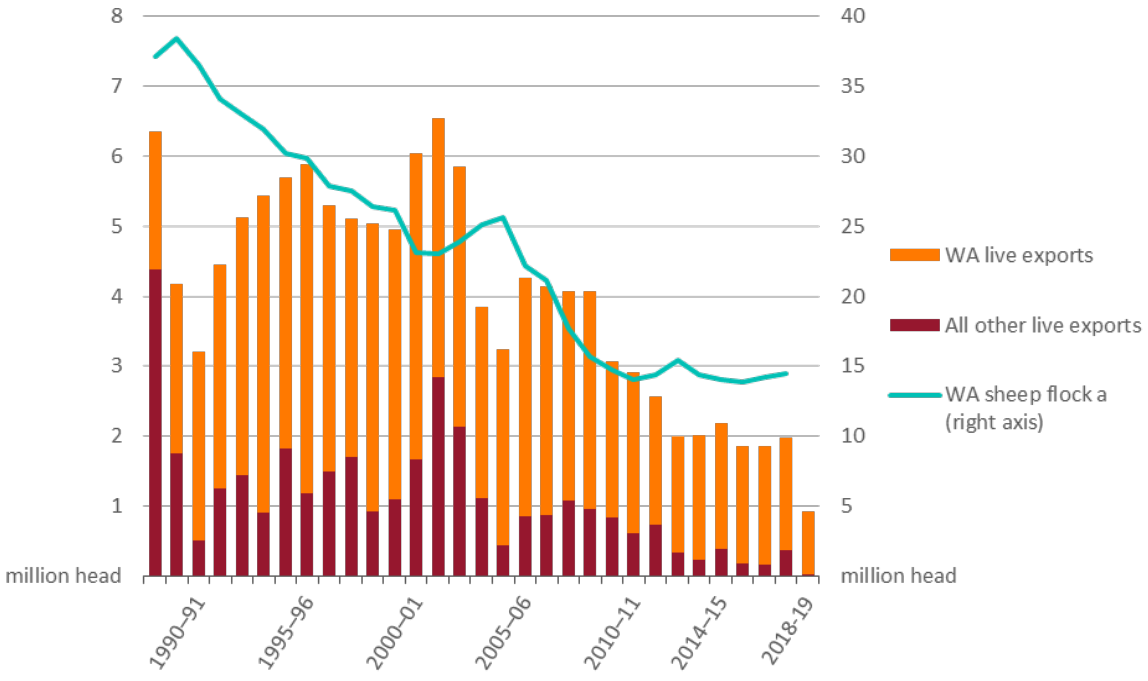
1.1 Live sheep export industry

In 2017–18 Australia exported around 2 million live sheep (valued at $239 million), which contributed 7% of the value of Australia's sheep and sheep meat exports, or about 3% of the global trade in sheep meat. Currently live sheep exports contribute around 0.5% of the value of Australia's total agricultural exports (ABARES 2019).

Exports of live sheep have declined since the 1990s due to a decline in the size of Australia's sheep flock and growing acceptance of chilled and frozen sheep meat in the Middle East (Figure 1). Low wool prices following the collapse of the wool reserve price scheme in 1991 provided a long-term incentive for farmers to switch from sheep to cropping. As a consequence, Australia's flock numbers fell from 170 million in 1988–89 to 70 million in 2017–18 (ABS 2013, 2019a).

The WA sheep flock was estimated to be 14.5 million in 2017–18 (ABS 2019a). In 2017–18, 1.6 million sheep were exported live from Western Australia, which equated to 82.1% of Australia's total live sheep exports (Figure 1). Ports in South Australia accounted for 16.8% of live sheep exports to, or through, the Middle East, while ports in Victoria and New South Wales accounted for 0.8% and 0.3%, respectively. In 2018–19 the drought affecting eastern Australia meant that almost all live sheep exports were from Western Australia. The drought, combined with the shipping standstill following the suspension of 2 exporter licences in mid 2018 and the prohibition of live sheep exports to the Middle East from 1 June to 22 September 2019, resulted in significantly less exports in 2018–19.

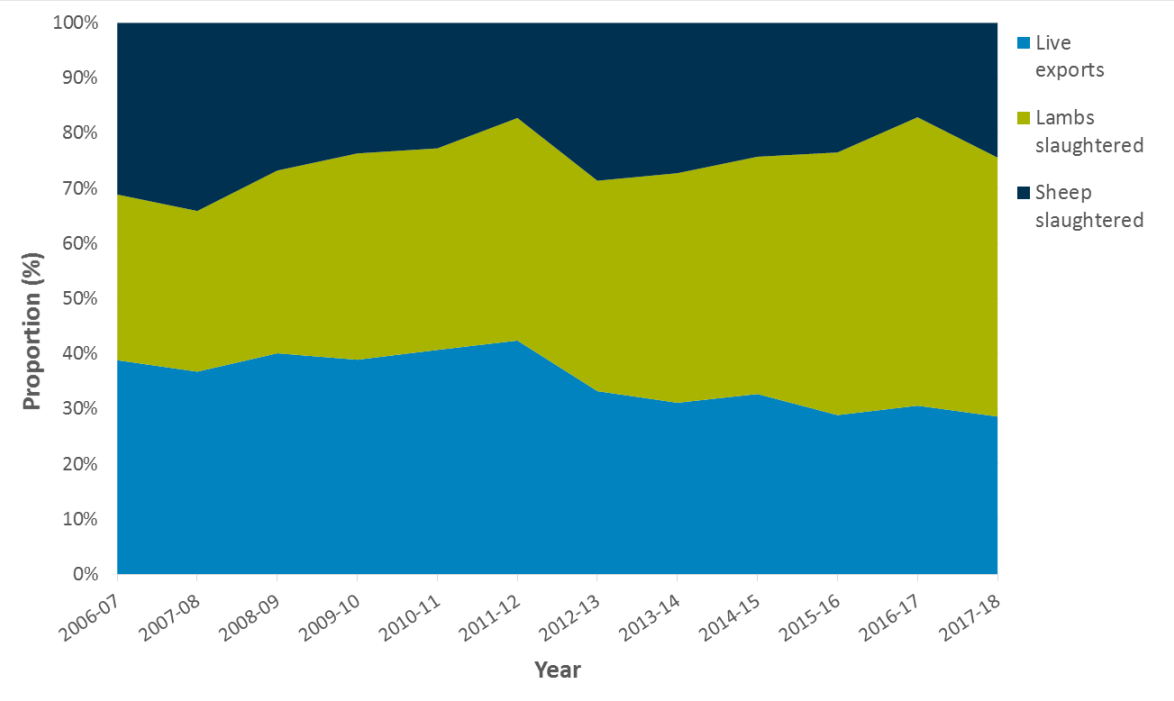
Figure 1 Australian live sheep exports and WA sheep flock, 1988–89 to 2018–19



Sources: Australian Bureau of Statistics (ABS) 2019, ABS 2013; Australian Bureau of Agricultural Research and Economic Sciences (ABARES)

Live sheep exports comprised an average of 30% of WA sheep turn-off from 2012–13 to 2017–18 (Figure 2). Since 2011–12, live sheep exports have been declining as a share of total WA sheep turn-off.

Figure 2 Breakdown of WA sheep turn-off, 2006–07 to 2017–18



Source: ABS 2019b; ABARES

Within Australia, the live sheep export industry has a range of stakeholders, many of whom also participate in other economic activities. The export supply chain includes:

- exporters
- land transporters
- livestock agents
- operators of registered premises
- other ancillary service providers
- producers
- shearers and wool agents
- ship owners and operators
- stock feed growers and manufacturers
- veterinarians.

LiveCorp's schematic of the supply chain is provided in Appendix A. Other interested parties in live sheep export policy include peak industry groups, animal welfare lobby groups, veterinary professional bodies, meat processors and state and territory governments.

1.1.1 Producers

In 2017–18 there were an estimated 1,800 sheep specialist farms (more than half of their income derived from sheep, lambs and wool) and 2,400 mixed–cropping sheep farms in Western Australia (less than half their income derived from sheep, lambs and wool). The WA sheep flock has evolved over the last 30 years, from being a wool-dominant flock to a flock producing both wool and sheep meat. An overview of the WA sheep production industry is provided at Appendix B.

In 2017–18, 47% of sheep turned-off in Western Australia were lambs for slaughter (Figure 2). ABARES data indicates that in 2017 to 2018, in the wheat-sheep zone, 43% of sheep enterprise farms were mixed enterprise, with the remaining classified as specialist sheep farms. The ABARES farm survey data shows that lamb production has been consistently more profitable than wool production over the last 2 decades (ABARES 2019). Both specialist sheep farms and mixed farms have oriented production towards lamb production.

The ABARES farm surveys also show that most farms with sheep in Australia sell sheep for live export from time to time (ABARES 2019). A small proportion of sheep farms sell sheep for live export every year and most of these are in Western Australia.

Exporters mostly purchase sheep for live export directly from farms, although may also purchase sheep via saleyards. In some cases, at the time of sale through saleyards it may not be known if sheep are to be processed locally or exported live.

Live sheep exports complement and add to the profitability of lamb production for Australian sheep farmers. This is especially true for sheep farmers in Western Australia where a combination of transport, market and agronomic factors have oriented the sheep industry towards live exports. WA farmers currently sell sheep for live export because it is more profitable than alternative markets. Most of Western Australia's pastoral areas have a short growing season (compared with southern New South Wales and Victoria) before hot summer conditions restrict pasture growth. These seasonal conditions do not always allow lambs to reach the weight and quality standards suitable for the Australian prime lamb market without supplementary feeding. In these situations, live sheep exports provide WA sheep farmers with a flexible 'relief valve' or profitable alternative to the local prime lamb market as lambs are well within the body condition requirements for the Middle Eastern trade. This means that a farmer can set out at the beginning of the season to produce prime lambs, but sell the same sheep for live export at reasonable prices if seasonal conditions are not favourable.

Due to its relative proximity, Western Australia also has a significant transport advantage for vessels to the Middle East over eastern Australian states.

In addition, industry stakeholders note that fewer domestic buyers and meat processors are present in WA sheep markets compared with eastern Australian states, and the competition provided by the live export market provides a relatively stable price floor for WA producers.

1.1.2 Transporters

The Australian Livestock and Rural Transporter's Association is a federation of 6 state associations, representing around 850 transport businesses. It includes owner–drivers, small fleet operators and large fleet operators. The number of transport businesses heavily reliant on live sheep exports is only a small proportion of the total number of these businesses. In their

submission to the discussion paper, LiveCorp advised that livestock transporters are specialised with purpose-built sheep trailers.

Industry groups state that road transport operators in Western Australia are highly dependent on the live export trade, averaging 25–50% of business revenue. According to LiveCorp, on average, the sale of sheep from farm to the live export trade requires 3.5 movements. In comparison, sheep sold to a WA abattoir would be moved just 1.5 times.

1.1.3 Shearing services

Shearing is a specialist skill and shearing is normally conducted on a seasonal basis. Shearing services form part of the live export supply chain, with the requirement under the Australian Standards for the Export of Livestock (ASEL) 2011 (version 2.3, S1.19) that sheep for live export must have wool not more than 25mm in length. This means that sheep for live export may need to be shorn out of the normal annual cycle to meet this requirement. Discussion with industry indicates that shearing for the live export trade can fill a gap in the work calendar for shearing services providers. A prohibition may distort the distribution of their workload, resulting in an imbalance between strenuous work periods and no work.

The Australian Livestock Exporters' Council's (ALEC) submission to the draft RIS states that the number of people employed in the shearing industry is in decline due to the declining sheep population nationally.

1.1.4 Registered premises

Registered premises are used for assembling and preparing livestock prior to export by sea. Sheep are currently held for a minimum of 5 days in a registered premises for Northern Hemisphere summer voyages, where they undergo inspection for health and welfare and other preparations prior to export.

At present, there are 12 registered premises in Australia approved to hold sheep prior to export. Depending on the time of year, between 75% and 100% of sheep destined for live export to the Middle East will be prepared at 3 of these premises, with all 3 located in Western Australia.

A registered premises may have indoor housing in elevated sheds or outdoor housing in paddocks, or a combination of both. Approved holding capacities for premises varies seasonally. The largest premises has a winter holding capacity of 140,000 sheep and a summer holding capacity of 84,000 sheep. If not used for live exports, these facilities could potentially be used as sheep feedlots to finish animals for domestic slaughter.

1.1.5 Stock feed manufacturers

There are 6 feed mills supplying feed to the live export sheep trade, 3 in Western Australia, 2 in South Australia and 1 in Victoria. The proportion of product sold to domestic markets versus live exports varies from business to business, with some manufacturers focusing their business on supplying live exports. In discussion with industry, it is estimated that for these 6 feed mills, between 50% and 90% of production is for the live sheep export trade, producing fodder specifically for consumption at registered premises and during voyages. It is estimated that these feed mills combined would employ around 100 staff directly, as well as contract balers, bale stackers, engineers, mechanics and straw and hay suppliers (Dalgleish et al. 2020).

Feed mills may also provide fodder for domestic prime lamb production.

1.1.6 Meat processors

The Western Australian Agriculture Authority estimated approximately 72% of meat processed in Western Australia was exported as chilled or frozen sheep meat (Western Australian Agriculture Authority 2016). In 2018, around 70% of sheep sold for meat by WA producers were processed in Australian abattoirs.

There are 11 meat processing plants in Western Australia, 8 of which are licensed to export sheep meat.

Sheep meat processing within Western Australia is under capacity. A long-term trend towards crop production reduced WA sheep numbers from around 36.5 million in 1990 to around 14 million in 2010. A plateau in sheep numbers since then has reduced annual slaughter by 22% from an average annual 4.6 million over the 10 years between 2000 and 2009, to 3.6 million per year over the 9 years from 2010 to 2018. Based on consultation with industry in 2018, it is estimated the under-utilised capacity in Western Australia is around 2 million head per year.

Meat processing often operates seasonally and routinely adapts to quite large fluctuations in demand. The department is aware of some industry interest in recommissioning existing but dis-used capacity.

1.1.7 Exporters

There are 33 exporters licensed to export sheep by sea. The majority of sheep exports are undertaken by 15 companies with 2 exporters accounting for over 80% of the trade by volume.

It has been estimated that between 8,000 and 10,000 people are involved in the live export (sheep and cattle) industries (Clarke et al. 2007) including all ancillary industries such as transport, veterinary and feedlot services. The number of people employed exclusively in live exports is smaller than this and includes buyers, staff operating registered premises, staff of exporting companies and specialist livestock staff working on ships (who may not be employed under Australian contracts).

Some operators in the live export industry are vertically integrated, owning vessels, feed mills, abattoirs and registered premises.

1.1.8 Ship owners

Sixteen different specialised vessels carried live sheep to the Middle East from 2015 to 2019. Three vessels accounted for almost 75% of live sheep exports from 2015 to 2018. These 3 vessels currently servicing the Middle East market from Australia are either owned by exporters or by shipping companies closely associated with exporters.

Ship owners are also regulated by the Australian Maritime Safety Authority under the Navigation Act 2012 and Marine Order 43 (Cargo and cargo handling – livestock) 2018. Vessels must have adequate systems for providing livestock services such as water, feed and fresh air.

1.1.9 Destination markets

The Gulf Cooperation Council (GCC) countries of Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates are the largest market for Australian live sheep exports, accounting for an average of 81% of exports since 1988. Australia has not exported live sheep to Saudi Arabia since 2012, however prior to 2012 it was a major market. The Middle East, including the GCC

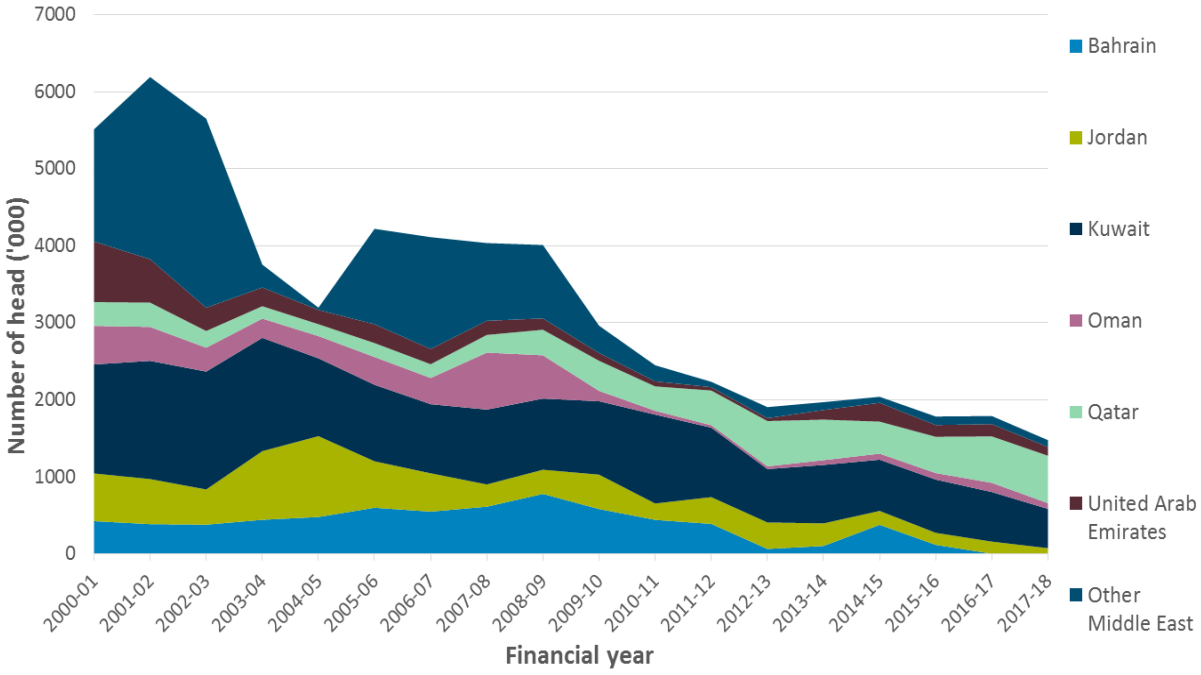
plus Turkey, Jordan and Israel received an average of 96% of Australia's live sheep exports over the same period. Figure 3 demonstrates that Kuwait and Qatar have been the top 2 destinations for live sheep over recent years.

Many countries in the Middle East that import live sheep have historically subsidised consumer prices for food staples, although ALEC indicates that at present, only 1 market provides a subsidy for live sheep imports. Subsidies generally apply to live animal imports, to assist those countries' domestic meat processors, and not to imports of processed meat. A combination of food subsidies and lower labour costs for meat processing in the Middle East enable exporters to pay Australian farmers a premium for live sheep.

According to ALEC, Australian livestock exporters to the Middle East compete with live sheep imports from Somalia, Sudan, Jordan, Spain, Romania, South Africa and others, to meet the growing demand for live sheep, largely due to an increasing population.

The Middle East is also Australia's largest export market for sheep meat. Growing populations, higher incomes and changing consumer preferences are driving an increased demand for pre-packaged meat in supermarkets. In response, frozen and chilled sheep meat exports to the Middle East from Australia increased from around 24,000 tonnes in 2006 to over 50,000 tonnes in 2018. Due to cultural preferences however, it is unlikely that frozen and chilled meat would entirely replace live sheep in the short to medium term. This is particularly so during religious festivals where demand for freshly slaughtered meat is likely to remain strong.

Figure 3 Australian live sheep exports to Middle East destinations



Source: ABARES 2018

1.2 Regulatory framework

The Australian Government regulates the live animal export trade under the Australian Meat and Live-stock Industry Act 1997, the Export Control Act 1982 and associated orders,

regulations and standards. This includes the ASEL and the Exporter Supply Chain Assurance System (ESCAS).

The regulatory framework is complex and covers a range of matters not specifically related to this RIS, for example, the issuing of livestock export licences and the regulation of registered premises. Appendix C outlines the regulatory framework for the live animal export trade.

1.2.1 Current regulatory framework

Current regulation that is relevant to this RIS for sheep exports to the Middle East are the Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East) Order 2018 (Middle East Order) made in July 2018 and the Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East – Northern Winter) Order 2018 (Northern Winter Order) made in October 2018.

The Middle East Order

In April 2018, the Australian Government commissioned Dr Michael McCarthy to review the conditions for the export of sheep to the Middle East during the Northern Hemisphere summer (the McCarthy Review). The McCarthy Review stated that 'the central issues relevant to sheep health and welfare during shipping to the Middle East in the months of May to October are stocking density, ventilation and thermoregulation in the sheep'. As a consequence, the department implemented changes set out in the Middle East Order, based on recommendations from the McCarthy Review.

Changes implemented by the Middle East Order aimed to more adequately address the risk of heat stress in the Northern Hemisphere summer and included requirements for:

- exporters to have a heat stress management plan for each voyage
- a reduction in the reportable (mortality) level from 2% to 1%
- stocking densities calculated using allometric principles (section 1.2.6)
- independent verification of pen air turnover (PAT)
- 10% extra space for horned rams
- Kuwait to be the first port of unloading for the vessel if it is one of the destination ports
- all vessels to be installed with automated watering systems
- provision of additional bedding.

The Middle East Order also has conditions for approved whistle-blower hotline posters at registered premises, ports and on vessels.

The Middle East Order only applies to voyages with sheep to, or through, the Middle East departing Australia in the Northern Hemisphere summer (from May to October, inclusive).

The Middle East Order is part of the regulatory status quo in option 1. It would also remain in place for options 2 and 3, though the anticipated prohibition period resultant in option 3 (from May to October, inclusive) would override application of the Middle East Order.

The Northern Winter Order

The Northern Winter Order applies to voyages of sheep to, or through, the Middle East departing Australia between the months of November to April. Amongst other conditions, the Northern Winter Order gives sheep 17.5% additional space compared with the ASEL (version 2.3). The Northern Winter Order is beyond the scope of this RIS and therefore not considered further.

1.2.2 Interim conditions during 2019

As an interim measure for 2019 only, pending completion of this RIS, the Australian Meat and Live-stock Industry (Prohibition of Export of Sheep by Sea to Middle East-Northern Summer) Order 2019 (Northern Summer Order) was implemented to prohibit live sheep exports to the Middle East from 1 June 2019 to 22 September 2019. This Order has now expired and does not form part of the regulatory status quo for this RIS.

For voyages in May, September and October 2019, exporters were also required to place environmental data loggers on all decks of vessels, and to collect and report this data to the department to provide a comprehensive picture of conditions on board vessels. This data is being analysed by the department.

1.2.3 Independent observers

In April 2018, as part of the government's commitment to better transparency of the trade, the live animal exports IO Program commenced. Independent observers are required to monitor, review and report on the implementation of activities in an exporter's approved export program. This may include taking digital still and video images to document onboard procedures and conditions. Information collected by the IO is provided to the department to inform and support effective regulation of the livestock export trade.

It is the responsibility of the exporter, including through the employment of an Australian Government Accredited Veterinarian (AAV) travelling on the vessel, to ensure the health and welfare of livestock for each livestock export consignment.

1.2.4 Australian Standards for the Export of Livestock

Livestock export licence holders are required to comply with the ASEL (version 2.3). The ASEL set the minimum requirements to ensure animals are fit to export from Australia, and their health and welfare is managed throughout the export voyage. The standards cover the sourcing and on-farm preparation of livestock for export as well as loading, onboard management and reporting requirements.

Managing the risk of heat stress in exported livestock using a HSRA was incorporated in the ASEL in 2004 and is now required for any shipment to, or through, the Middle East. Standard 4 part 12 of the ASEL (version 2.3) states that:

> Stocking densities and pen-group weight-range tolerances for species of livestock must be in accordance with specifications in Appendix 4.1 and heat stress assessment using an agreed heat stress risk assessment unless a variation is required and approved by the relevant Australian Government agency.

HotStuff (version 4) has been the HSRA software tool agreed between industry and the department since 2012. Note that Appendix 4.1.6 of the ASEL defines minimum pen area requirements for exported livestock before HSRA is applied.

The most recent review of the ASEL (for exports by sea) concluded in March 2019. There will be no changes to the requirement for a HSRA on Middle East sheep voyages. The review did recommend that a HSRA be mandated for all livestock sea voyages that cross the equator. The next version of the ASEL (version 3) will be implemented in 2020.

1.2.5 Heat stress risk assessment

A HSRA is required for all sheep exports to, or through, the Middle East. It forms part of the regulatory status quo of option 1 in this RIS.

In 2003 industry developed the first version of HotStuff, a predictive heat stress model to manage the risk of heat stress on live export vessels. Deck conditions are determined by the ambient temperature, the metabolic heat produced by the livestock on deck and the ship's ventilation rate for that deck. HotStuff adjusts stocking densities to limit the total metabolic heat production to ensure deck conditions experienced by livestock remain within agreed risk parameters. HotStuff considers voyage inputs relating to sheep, climate and ship ventilation factors.

The current HotStuff model relies on mortality as an indicator of animal welfare. Mortality was used as a regulatory end point because it is an objective measure, however the HSRA review found that 'mortality is an insufficient indicator of animal health and welfare, given that animals may suffer and have reduced welfare without actually dying'. More detail about HSRA and the HotStuff model is at Appendix D.

1.2.6 Allometric principles for pen space allowance

The McCarthy Review noted the importance of space allocation, stating that it was 'recommended that an allometric approach be adopted by the industry … with a k-value of 0.033 (k=0.033)'. Allometric principles use the relationship between the physical characteristics of an animal, such as size and body shape, and aspects of its physiology, to estimate the space requirements of an animal. McCarthy cited Petherick and Philips (2009), explaining that k=0.033 is the 'threshold below which there are consistent adverse effects on welfare outcomes in intensive housing'. McCarthy also stated that a 'lesser k-value of 0.027 provides sufficient space for animals to stand and lie down but does not, according to the authors, allow free access to troughs'.

The allometric approach provides an additional 11% to 39% pen space compared with requirements under the ASEL (version 2.3).

1.3 Defining animal welfare

The concept of animal welfare can be difficult to define as it has a number of dimensions, including psychological and physical aspects, people's subjective evaluations, as well as historic and cultural differences.

1.3.1 International standards

There are internationally agreed concepts of animal welfare. The World Animal Health Organisation (OIE) is an intergovernmental organisation responsible for improving animal health and animal welfare standards worldwide. In 2019 it had 182 member countries, including Australia. The OIE's (2019) guiding principles for animal welfare note that there is a critical relationship between animal health and animal welfare.

The OIE (2019) defines animal welfare to mean:

> The physical and mental state of an animal in relation to the conditions in which it lives and dies. An animal experiences good welfare if the animal is healthy, comfortable, well-nourished, safe, is not suffering from unpleasant states such as pain, fear and distress, and is able to express behaviours that are important for its physical and mental state. Good animal welfare requires disease prevention and veterinary care, appropriate shelter, management and nutrition, a stimulating and safe environment, humane handling and humane slaughter or killing. While animal welfare refers to the state of the animal, the treatment that an animal receives is covered by other terms such as animal care, animal husbandry, and humane treatment.

Multiple studies have linked heat stress to poor animal welfare. Caulfield and colleagues (2014) specifically identifies that heat stress is a major contributor to poor animal welfare associated with long-haul live export voyages, negatively affecting livestock health and productivity.

1.3.2 Australia's approach

Under the Australian Constitution, the Australian Government's role in animal welfare is largely limited to issues related to international trade. The Australian Government has responsibility for trade and international agreements, in relation to the welfare of animals involved in the live animal export trade and animals processed at export abattoirs. Details of this regulatory framework can be found at Appendix C.

The welfare of farm animals, including sheep, within Australia is a state and territory government responsibility. State and territory governments regulate, enforce or otherwise ensure animal welfare in their state or territory. The Australian Government works together with the states and territories to develop nationally consistent standards and guidelines to assist the development of regulations in each jurisdiction.

The *Australian Animal Welfare Standards and Guidelines - Sheep* (Animal Health Australia 2016) (the AAWSG) are supported by Animal Health Australia and were agreed by state and territory governments in 2016. The AAWSG specify the standards of management and husbandry required to protect and maintain the welfare of sheep in Australia. As part of the Australian Animal Welfare Strategy, the AAWSG recommend detailed welfare needs of sheep, including the appropriate provision of feed and water, management of weather, disease, injury and predation, facilities and equipment, handling and husbandry, breeding management, intensive sheep production systems, and humane slaughter. The purpose of the document 'is to provide contemporary standards and guidelines for the welfare of sheep in Australia. The document informs all those with responsibilities for the care and management of sheep. The AAWSG provide the basis for developing and implementing consistent legislation and enforcement across Australia, and direction for people responsible for sheep. They reflect available scientific knowledge, current practice and community expectations.' Most state and territory governments have regulated the AAWSG into law.

1.3.3 Public perceptions of animal welfare and the live sheep export industry

Many studies indicate that the welfare of animals is becoming increasingly important to livestock industries, governments, consumers and the general public, both in Australia and overseas.

For example, in 2017 the department requested consultancy firm Futureye to undertake social research to identify expectations of farm animal welfare, to understand whether the current regulations are perceived to be sufficient. Futureye's report (2018) tracked issues around farm animal welfare and how they may influence the 'social license' of parts of the industry. According to Futureye, the public's view on the status of animals is evolving particularly in relation to the issue of animal sentience, rights and freedoms and especially the freedom from pain and cruelty. There are high levels of agreement in Australian society on an animal's right to not be subjected to unnecessary pain and suffering.

Clear findings from surveys of the Australian public carried out by Futureye, show 95% of people view farm animal welfare to be a matter of concern, and 91% wanting more effective regulation or reform. Futureye also found that poor animal welfare standards on board live export ships ranks as the highest driver of community concern, particularly when accompanied by graphic pictures and widespread media attention. Futureye surveys found that over 80% of the public found live animal exports moderately to extremely concerning, and that 60% thought live animal exports should be banned.

A recent study on community opinion on the live export trade showed that the Australian public suffers sadness, distress and anger from the knowledge of poor treatment of Australian animals, with the majority indicating an interest in seeing the trade end (Sinclair et al. 2018). Another study identifies improved psychological wellbeing, good staff retention and job satisfaction of humans working with animals in high welfare systems (Dawkins 2017).

While concern for animal welfare is widespread throughout the community, the underlying set of ethical values used to interpret and act on this concern varies between individuals and groups, which raises significant challenges for policy makers and regulators.

1.3.4 Indirect benefits of improving animal welfare

Improving animal welfare directly benefits animals, but also provides additional business and economic benefits. Animal welfare plays an important role in supporting industry sustainability, promoting business growth, protecting employee health and wellbeing, and building community trust in the industry and the regulator. Further details of these benefits can be found in Appendix E.

2 The problem

Public confidence in the live sheep export trade and the department as the regulator has been undermined by recent heat stress events in exported sheep. Regulations for live animal exports to the Middle East did not provide adequate measures to protect the welfare of live sheep. The Australian community, as a stakeholder, has expressed that priority should be given to good welfare outcomes in the live sheep export trade. The department also recognises that maintaining the welfare of exported sheep is important, for the direct benefit of the animals undergoing transport and to support a viable export sheep trade.

Extreme temperatures and humidity during the Northern Hemisphere summer give rise to conditions which have the potential to cause heat stress in sheep and negatively impact their welfare. Another heat stress event may lead to a swelling of public opinion and political pressure against live sheep exports, which could reduce the trade and potentially lead to its closure. To ensure the sustainability of the live sheep trade, it is essential that the risk of heat stress is effectively managed and certainty provided to industry and Australia's trading partners. As such, improved animal welfare outcomes have become crucial to the ongoing sustainability of the live sheep export trade.

There is evidence that another heat stress incident could disrupt the trade and potentially risk the permanent closure of the trade. Previous examples of negative animal welfare incidents in the live sheep export trade have resulted in prolonged suspension of trade from Australia. This includes the shipping standstill of sheep to the Middle East in 2018 and, in 2019, the industry moratorium and formal suspension of the trade. Sinclair and colleagues (2018) found that the majority of Australians had negative views towards the live export trade and that media exposés increased the proportion believing the trade should end. Futureye (2018) found that over 80% of the public found live animal exports moderately to extremely concerning, and 60% thought live animal exports should be banned. In addition, the core theme of the McCarthy Review in 2018 was to place a much stronger emphasis on the welfare of exported sheep, demonstrating a 'quantum shift in attitude and behaviour'.

While it is not known what level of heat stress event would spark further public reaction, it is assumed that any reportable mortality from a heat stress event (a mortality level greater than 1%) could build public and political pressure against the trade. It is also uncertain how the government would react to another heat stress incident, however, previous incidents have shown that poor animal welfare on board live export vessels has led to strong public outcry for reform or banning of the trade. This poses a significant risk to the ongoing viability of the industry.

2.1 Background to the problem

Heightened public scrutiny of the live export industry has raised awareness about the onboard welfare of sheep. This concern led to the McCarthy Review (2018) which had the core theme of placing a much stronger emphasis on animal welfare. One of the McCarthy Review recommendations was that 'industry should move from a risk assessment based on mortality to a risk assessment based on animal welfare'. ALEC implemented a 3-month moratorium on trade during June, July and August 2019. However, relying on a voluntary industry moratorium would

not meet the expectations of the Australian community, nor provide the trade with the certainty it requires.

Importantly, even a 3-month industry-led moratorium is not long enough to effectively manage heat stress. While developing the interim conditions in 2019, the department undertook a technical analysis of the risk of heat stress during the Northern Hemisphere summer using data collected on voyages. This analysis also reviewed the best available science and evidence including climatological analysis by the Bureau of Meteorology (BoM 2019), information from the McCarthy Review, the HSRA Review and public submissions to these reviews. In particular, the Bureau's analysis demonstrated that the risk of temperature extremes is 5% or more during and beyond industry's June to August moratorium period. For example, the risk of extreme temperatures in September is as high, or higher, than the risk in June. The Bureau's analysis also shows that some destinations, such as Qatar and Oman, have longer hot periods with greater risk of extreme temperatures. An explanatory note outlining the department's technical analysis is at Appendix F.

The temporary measures that applied in the 2019 Northern Hemisphere summer (section 1.2.2) have lapsed. Currently, sheep exports to the Middle East during the Northern Hemisphere summer are regulated primarily by the Middle East Order. These conditions include allometric pen space allowances and that exporters submit a heat stress management plan for each voyage. This addresses the issue in part, but does not adequately mitigate the risk of heat stress if ambient temperatures are very hot, as they can be in the Middle East during June to mid September (inclusive). In this circumstance, conditions can be such that additional pen space allowances do little to reduce the risk of heat stress.

The Australian public's opinion of the *Awassi* incident was evident in media released at the time and has been identified in research conducted by Futureye (2018) and Sinclair and colleagues (2018). In addition to the animal welfare concerns themselves, an incident that causes a repeat of such public outcry is likely to result in pressure that could lead to closure of the trade. Other consequences could include:

- damage to Australia's reputation with regards to animal welfare, and as a producer of high quality livestock, reducing demand for Australian exports
- loss of income to farmers and associated businesses
- loss of trust in the Australian Government and its role as a regulator
- loss of the live export industry's 'social license' to operate
- further disruptions to trade with the potential for extreme regulation
- decline in domestic consumer trust for livestock production systems in general, leading to a decline in domestic demand for animal agricultural products.

Stakeholders impacted by regulatory failures identified during this process, include:

- businesses in the live sheep export supply chain who suffered reputational damage and loss of 'social license'
- businesses in the live sheep export supply chain who suffered lost income from disruptions to trade
- employees and communities directly reliant on the trade
- members of the public who are distressed by poor welfare in live exports
- the department, as the regulator, as public confidence in its regulatory capability was eroded
- trading partners that want a reliable live export trade to support their food security.

See section 1.1 for more information about the live export supply chain.

3 Why government action is needed

3.1 Objectives of government action

The primary objectives of government action are to:

- improve animal welfare outcomes by reducing the risk of heat stress in sheep exported to, or through, the Middle East during the Northern Hemisphere summer to a very low level (less than 5% risk of temperatures that could cause heat stress)
- maintain a viable live sheep export trade supported by improved animal welfare outcomes, that as a minimum meets the requirements of the ASEL and relevant legislation
- uphold Australia's reputation as an exporter of high-quality livestock.

3.2 The need for government intervention

Section 2 highlights that live-exported sheep have been subjected to levels of heat stress risk and consequently poor welfare that was considered unacceptable by the Australian community. According to the Moss Review (2018), some exporters 'may have behaved in a non-compliant way that has adversely affected the reputation of the industry as a whole'.

It is noted that ALEC independently implemented a 3-month moratorium on trade during June, July and August 2019. However, relying on a voluntary industry moratorium would not meet the expectations of the Australian community, nor provide the trade with the certainty it requires. Reliance on industry-led initiatives alone may not encompass all exporters and stakeholder feedback from different industry members has raised varying potential periods for a moratorium. Although ALEC members currently account for more than 96% of Australia's annual livestock exports by volume and value, a voluntary moratorium is not able to be enforced. There is potential for exporters to withdraw their support for a moratorium so they can fill the gap created in the market.

Therefore, government intervention is deemed necessary to ensure heat stress risk in sheep exports is managed before the onset of the 2020 Northern Hemisphere summer period.

If the Australian community and/or trading partners lose trust in the department as a regulator it would have implications for all aspects the department regulates, including other exports and biosecurity.

3.3 Government capacity to intervene successfully

As regulator of the live export industry, the department has the necessary legislative authority and organisational resources to intervene. It is not possible to export live animals from Australia without Australian Government approval. The department regulates livestock exports under the Export Control Act 1982, the Australian Meat and Live-stock Industry Act 1997 (AMLI Act) and associated orders, regulations and standards (Appendix C). The department has the capability and capacity to implement the existing regulatory requirements to ensure that exports meet importing country animal health requirements and existing animal welfare requirements.

Under this framework there are specific interventions relating to sheep exported by sea to, or through, the Middle East. In summary, these interventions include the:

- Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East) Order 2018 (Middle East Order) in response to recommendations of the McCarthy Review including the provision of pen space allowance by an allometric calculation (section 1.2.6)
- Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East – Northern Winter) Order 2018 (Northern Winter Order) to provide sheep on voyages to, or through, the Middle East from November to April with additional space (the ASEL +17.5%)
- requirement for all live sheep voyages to, or through, the Middle East to be overseen by IOs
- Northern Summer Order to apply conditions for the Northern Hemisphere summer period of 2019.

The department was also scrutinised by several independent reviews, initiated in response to the *Awassi* incident (Appendix G) and has implemented most recommendations from these reviews.

4 Policy options

Three options were considered to respond to the problems identified in section 2. In different ways and to different degrees, the options address the objectives stated in section 3, to minimise the risk of heat stress and thereby improve animal welfare outcomes on live sheep export voyages to, or through, the Middle East during the Northern Hemisphere summer, while sustaining a viable sheep export industry.

The options considered in this RIS are:

1) Option 1: Maintain the regulatory status quo; this option represents the baseline regulatory framework.
2) Option 2: Implement a prohibition on live sheep exports from 1 June to 14 September with additional conditions.
3) Option 3: Implement a prohibition on live sheep exports from 1 May to 31 October (Northern Hemisphere summer).

4.1 Option 1: Regulatory status quo

Option 1 represents the regulatory status quo. The regulatory status quo for Northern Hemisphere summer live sheep exports comprises the existing acts and subordinate legislation, including the Middle East Order, and requirements of the ASEL (Appendix C). This option does not include any interim regulations or conditions implemented during 2019 to manage the risk of heat stress in Northern Hemisphere summer sheep exports, such as the 2019 prohibition (section 1.2.2).

The regulatory status quo does not prohibit any voyages and therefore under option 1, trade could occur for all months of the Northern Hemisphere summer.

Box 1 Summary of option 1: Status quo

Live sheep exports to, or through, the Middle East permitted for all months of the Northern Hemisphere summer.

Conditions under the Middle East Order and the in-force version of the ASEL apply for voyages during the Northern Hemisphere summer months including pen space allowance according to the greater of allometric principles or a HSRA.

Requirement for all voyages to conduct a HSRA using the existing HSRA model, HotStuff (version 4).

4.2 Option 2: Prohibition from 1 June to 14 September to all ports with additional prohibition periods for Qatar and Oman

Option 2 includes a prohibition of departures of live sheep exports from Australia to, or through, the Middle East for 3.5 months (1 June to 14 September). There would be extended periods of prohibition of departures from Australia for Oman from 8 May to 14 September and Qatar from 22 May to 22 September. While we do not presently export to Bahrain, a prohibition under this

option would include Bahrain from 1 June to 14 September. The department would assess any new proposed Middle East destinations during the Northern Hemisphere summer on a case-by-case basis.

Under option 2, the risk of heat stress would be managed through:

- the baseline regulations
- the prohibition of exports during very hot periods
- additional prohibition period to ports where the ambient temperatures exceed the 95th percentile (such as in Oman and Qatar)
- limiting the duration of exposure to hot conditions on vessels, by having no more than 2 ports of discharge for voyages arriving in the Persian Gulf (in the immediate shoulder periods to the prohibition)
- additional conditions to improve heat tolerance in sheep (wool length and body condition)
- environmental and behavioural monitoring.

The prohibition periods have been based on data from the Bureau for 95th percentile ambient wet bulb temperatures at various locations in the Middle East. Using 95th percentile ambient temperatures prevents exports when there is a 5% or greater likelihood that temperatures experienced on voyages to, through or at destinations in the Middle East, could cause heat stress in sheep. When considering the current HSRA model, Stacey (2018) determined that the 'risk level (2% [chance] of 5% mortality) is roughly equivalent to a 5% chance of a voyage having 2% mortality'. When developing conditions under option 2, the department also considered 98th percentile temperatures, as recommended by the HSRA review, and found these did not materially differ from 95th percentile temperatures. Appendix F outlines the technical analysis and rationale for this risk threshold.

In addition to a prohibition, option 2 includes other conditions aimed at reducing heat stress and improving welfare outcomes of sheep exported during the Northern Hemisphere summer period. It also includes a condition change aimed at reducing unnecessary regulatory burden.

4.2.1 No more than 2 ports of discharge for voyages arriving in the Persian Gulf during June or departing Australia between 15 and 30 September

Under this option, the department would require no more than two (2) ports of discharge for voyages either arriving in the Persian Gulf on or after 1 June or departing Australia between 15 and 30 September.

Voyages to the Persian Gulf routinely discharge at multiple ports, with Kuwait generally receiving the largest numbers of sheep. The regulatory status quo requires that if Kuwait is one of the destinations, the exporter must discharge sheep in Kuwait first. This requirement for Kuwait to be the first port of discharge would also apply for option 2, if Kuwait is one of the destinations. The purpose of this requirement is to ensure as many sheep as possible are discharged before the voyage continues onto hotter and more humid parts of the Persian Gulf. The requirement for voyages to discharge at no more than 2 ports limits the duration sheep would be required to stay on vessels in the Persian Gulf. This requirement would not apply to

voyages to the Red Sea. Red Sea voyages often go to multiple ports but the hottest part of the voyage pertains to a common part of the route in the southern part of the Red Sea, through the Bab al Mandab Strait. Once a vessel reaches the points of discharge in the Red Sea, they are in relatively cooler climates.

4.2.2 Sheep should be exported with the shortest wool length possible and this must not be greater than 25mm in length for each animal

The ASEL (version 2.3) stipulate that sheep must not be exported if they have wool greater than 25mm in length. There is a provision that would allow exemptions to this. The purpose of this condition is to ensure no sheep would be exported during the Northern Hemisphere summer (1 May to 31 October) period if they have wool greater than 25mm in length.

4.2.3 Body condition score of exported sheep must be 2 or more and less than 4, on a scale of 1 to 5

This requirement is included to ensure sheep exported to the Middle East during the Northern Hemisphere summer (1 May to 31 October) have a body condition score of 2 or more and less than 4. Body condition score is a rating of the fat cover on an animal, using a scale from 1 (emaciated) to 5 (overfat). This scale provides a simple and practical approach to body condition scoring. Details of this scoring system can be found in the ASEL.

4.2.4 Voyage monitoring

This condition would require exporters to equip vessels with automated environmental data loggers for all voyages during the Northern Hemisphere summer (1 May to 31 October). Daily reports would be required to be submitted to the department by the exporter for all voyages to the Middle East. In addition, targeted behavioural observations would be required with all monitoring to be reported to the department within 5 days of the end of the voyage. This information would improve the department's awareness of onboard conditions and provide evidence to inform future reviews of sheep export conditions.

4.2.5 Removal of requirement to use existing HSRA model

This option proposes removing the requirement to use the existing HSRA model for the Northern Hemisphere summer.

Box 2 Summary of option 2: Prohibition from 1 June to 14 September to all ports with additional prohibition periods for Qatar and Oman

Live sheep exports to, or through, the Middle East prohibited from 1 June to 14 September for all ports with additional prohibition periods of departure from Australia for Qatar and Oman:

- departures for Qatar prohibited from 22 May to 22 September
- departures for Oman prohibited from 8 May to 14 September
- no more than 2 ports of discharge for voyages arriving in the Persian Gulf after 1 June and departing Australia between 15 and 30 September.

For all voyages between 1 May and 31 October:

- base regulation of the Middle East Order and the in-force version of the ASEL
- sheep should be exported with the shortest wool length possible and this must be not greater than 25mm for each animal
- body condition score of exported sheep must be 2 or more and less than 4, on a scale of 1 to 5
- all voyages must be monitored with automated environmental measurements and targeted behavioural observations and this monitoring reported to the department
- no requirement for a HSRA during the Northern Hemisphere summer.

4.3 Option 3: Implement a prohibition on live sheep exports from 1 May to 31 October (Northern Hemisphere summer)

Under option 3, the risk of heat stress in sheep would be managed by prohibiting live sheep exports during the entire Northern Hemisphere summer from 1 May to 31 October inclusive, until the revised HSRA model is available. Once the approved revised HSRA model is available, the prohibition from 1 May to 31 October inclusive would sunset and the revised HSRA model would be implemented to manage the risk of heat stress during the Northern Hemisphere summer.

A revised model would use heat stress thresholds (HSTs) instead of the mortality thresholds currently used (section 1.2.5). This option aligns with recommendations by the independent HSRA Technical Reference Panel outlined in the final HSRA Report.

If the revised HSRA model permitted voyages at any time during the Northern Hemisphere summer then conditions under the Middle East Order and the in-force version of the ASEL would apply, including pen space allowance according to the greater of allometric principles or a HSRA.

Box 3 Summary of option 3: Prohibition from 1 May to 31 October to all ports

Manage the risk of heat stress by implementing a 6-month prohibition period (1 May to 31 October, inclusive).

The 6-month prohibition would remain in place until an approved revised HSRA model is available, whereby the 6-month prohibition would sunset.

5 Benefits and impacts of option 1

Option 1 represents the regulatory status quo. Under option 1 the risk of heat stress in sheep would be managed by conditions of the Middle East Order in conjunction with the existing HSRA model. The Middle East Order was made in July 2018 and did not require a RIS by a Prime Minister's exemption, dated 17 May 2018.

Allometric pen space allowances under the Middle East Order provide sheep with greater space than the current HSRA model in most cases. Only vessels with the lowest ventilation rates in the fleet would be destocked by the HSRA model by 9–10% more than would be required by allometric calculations and only for August (Appendix H). This means that most exports for the Northern Hemisphere summer months would be conducted at allometric requirements as dictated by the Middle East Order.

Under option 1, trade would be permitted for all months of the Northern Hemisphere summer.

5.1 Option 1 benefits

Option 1 has the least financial impact on the industry. Under the regulatory status quo, there would be year-round income streams from sheep exports and the maintenance of commercial relationships with a stable supply for importers. By permitting live export of sheep throughout the year, industry stakeholders and supply chain participants would regain business from the export trade that reduced during the shipping standstill in 2018 and the prohibition period in 2019. The Department of Primary Industries and Regional Development (DPIRD) states 'the live export trade of sheep from Western Australia is worth $210 million (2017)'. Producers, especially those in Western Australia, would also have greater flexibility for turning off sheep to live exports when needed to support their farming practices.

Resumption of trade throughout the year, would restore Australia's international reputation as a reliable source of high quality agricultural produce, leading to opening of new markets and trade expansion for the live sheep export industry, and potentially other exported goods.

Year-round trade would support the cultural practices conducted in those countries during religious festivals, so they could continue without disruption.

Option 1 would also provide some direct animal welfare benefit when compared with live sheep export conditions prior to 2018. The allometric space allocation formula in the Middle East Order provides exported sheep with more space than export conditions in place prior to 2018. Although based on a small number of voyages, the application of allometric stocking densities during the 2018 and 2019 Northern Hemisphere summer shoulder periods has resulted in mortality rates declining by 73%. Details on allometric pen space allowances are in Section 1.2.6 and Appendix H.

5.2 Option 1 impacts

5.2.1 Regulatory impacts

If a heat stress welfare event occurred it may generate public and political pressure against the trade, with calls for extreme regulation. In the department's view, this chain of events may occur

under option 1, as the heat stress risk mitigation measures applied would not be effective when temperatures are very hot.

There also continues to be ongoing public feedback against the trade. The Australian community places a priority on good welfare outcomes, and organised stakeholder groups can exert significant influence. Prolonged suspension of the live animal export trade to other markets has already occurred following poor animal welfare incidents. For example, in 2011 when video footage emerged showing animal cruelty in Indonesian abattoirs, there was public reaction and the Australian Government suspended all live cattle exports to Indonesia. In 2013, when video footage emerged showing cruelty to cattle exported live to Egypt, exports of all Australian livestock to Egypt were suspended. Additionally, ceasing live animal export was in the election manifesto of one of the major political parties in the most recent election. Resultant restrictions to the trade could render it uneconomic, or end the trade.

If ambient temperatures are very hot, as occurs from June to mid September (inclusive) in the Middle East, no amount of additional space will allow for metabolic heat loss. During this time period, climatological data indicates that even a single sheep on a vessel deck has a 5% or higher risk of experiencing conditions that could result in heat stress and poor welfare. Additionally, historical data analysed by the department confirms that the highest risk months for elevated mortality rates in sheep transported to, or through, the Middle East are June to mid September. Therefore, option 1 has a greater risk of impacting animal welfare than options 2 and 3.

Animal welfare advocates and industry organisations alike rejected option 1. The RSPCA Australia stated that 'the regulatory status quo, without a prohibition period, would lead to unacceptable animal suffering, and inevitably, to another adverse animal welfare event, which would lead to the end of the trade'. LiveCorp stated that 'it does not provide sufficient assurances on animal welfare outcomes and would place the trade at risk'. In addition, the public consultation process for the draft RIS demonstrated minimal support for the status quo option, with only 3 of 21 submissions providing any support for this approach.

A range of estimates have been put forward concerning the cessation of the live sheep trade. Modelling studies funded by animal welfare groups tend to conclude that the economic impacts of ending live sheep exports would be relatively small. Alternatively, studies funded by industry tend to suggest costs will be relatively large. Both groups of studies present unlikely degrees of adjustment to alternative markets—either too high or too low. Data from past measures on actual impacts suggest that the likely adjustment will lie in between these published studies (see Appendix I for details on the direct financial impact for stakeholders). The department has assessed that the costs of cessation of trade would likely be initially high, (though lower than industry estimates), but significantly reduced thereafter as producers switch to alternative markets and supply chains adjust.

Based on the current value of the trade, the department estimates that export restrictions resulting from cessation of the trade would impact the income of sheep producers in Western Australia around $68 million in the first year, reducing to around $12 million in the third and subsequent years. If live exports were to cease, sheep and lamb prices in Western Australia are estimated by the department to fall by around 20% in the first year of adjustment and would reduce the average income of sheep specialist producers by over 40%.

Although it is not certain another heat stress welfare event would lead to cessation of the live sheep export trade, this outcome is still worth exploring. The department acknowledges that it is difficult to accurately determine the outcomes of extreme regulation, or an end, to the live sheep export trade to the Middle East. While some redirecting of sheep from live export to the domestic market would occur, the department notes that there is not normally a domestic market for this volume of young wethers in Australia because domestic consumers prefer different meat characteristics. Bringing these wethers to prime lame standards would require supplementary feeding, adding 4–13% to the average annual operating costs of WA sheep producers. Longer term, alterations to genetics on farm to produce lamb more fitting for Australian domestic and international boxed meat markets would be required. Additionally, redirecting this volume of sheep to domestic markets is likely to cause a short-term adjustment in the meat processing sector. A long-term decline in the Australian sheep industry has meant a gradual decommissioning of processing facilities, particularly in WA. While the department believes these facilities can be recommissioned within a few months, doing so is likely to involve some costs that will be passed back onto farmers as lower saleyard prices. The department estimates this short-term fall in saleyard prices is limited by the cost to farmers of trucking sheep to eastern state markets, which is around $20 per head. Sheep meat prices set by world markets also impacts the price of meat in Australia. Therefore, the overall cost to industry remains unknown.

Industry feedback has stated that ending the trade would have significant financial impact for industry stakeholders including producers, exporters, importers in receiving countries, ship owners, feed producers, road transport operators, AAVs, shearing services, livestock agents and other supply chain participants including sheep buyers, stock handlers, quality assurance technicians and quality control specialists. While detail of the quantitative impact of ending the live export trade of sheep to the Middle East was not provided in submissions, some of the consequences to industry stakeholders were described. For example, almost all feed for the live sheep export trade is supplied by 2 feed mills in Western Australia. Both of these mills are heavily invested in the trade with 1 major manufacturer allocating 77.5% of total feed production in 2019 and 87.4% of total feed production in 2018 to live sheep exports. This gives an estimate of the anticipated reduction in business for these supply chain participants if the trade were to be ceased. Feedback indicated the shearing industry would also be impacted as a consequence of cessation or extreme reduction in trade, with numbers of skilled shearers already low and workers leaving the industry in periods of limited work during the off season.

5.2.2 Compliance costs

As the status quo option, there are no added compliance costs.

5.3 Option 1 summary

The Middle East Order has reduced the risk of a heat stress event, however the risk of such an event from June to mid September remains 5% or greater, due to extreme temperatures that could be incurred on voyages at this time. This may not meet Australian community expectations. Stakeholder feedback indicated option 1 was strongly opposed by the majority of stakeholders.

Option 1 would have less impact on the financial viability of industry participants with greater access to lucrative Middle East markets and less disruption to supply chains and in particular, better ability for producers to manage feed and stocking levels across the year.

A significant heat stress event could threaten the viability of the industry through pressure on government to suspend or shut down the trade.

6 Benefits and impacts of option 2

For the Northern Hemisphere summer period, option 2 combines a prohibition period from 1 June to 14 September with requirements under the Middle East Order and the ASEL. Based on analysis of voyage routes and destination climates, option 2 presents an extended prohibition for Qatar and Oman. Option 2 also imposes additional conditions for voyages in May, late September and October and requirements for the selection of sheep to better manage heat stress, including shorter wool length and lighter body condition.

The department has amended the additional prohibition periods for Qatar and Oman proposed in the draft RIS, following review of 95th percentile temperature data from the Bureau, taking into account the diurnal variation in ambient temperatures of between 3°C and 4°C wet bulb temperature (WBT) at destination ports in June and stakeholder feedback on the viability of the live sheep trade.

The requirement to only permit a single discharge port for the Persian Gulf proposed in the draft RIS was amended to permit no more than 2 ports of discharge. This amendment was based on stakeholder feedback from the draft RIS that a single port of discharge condition would have unintended negative diplomatic, trade and economic implications, with minimal evidence of improved welfare outcomes.

Additionally, the wool length limit was increased from the 15mm limit proposed in the draft RIS to be not greater than 25mm for each individual animal as feedback indicated a condition for 15mm would have greater negative welfare outcomes than benefits.

Stakeholder feedback also determined that a half body condition score would be difficult to assess. Therefore this requirement was also amended so that exported sheep must be from condition score of 2 or more and less than 4, on a scale of 1 to 5.

The conditions applied in this option are designed to reduce the risk of heat stress on voyages to, or through, the Middle East to a very low level.

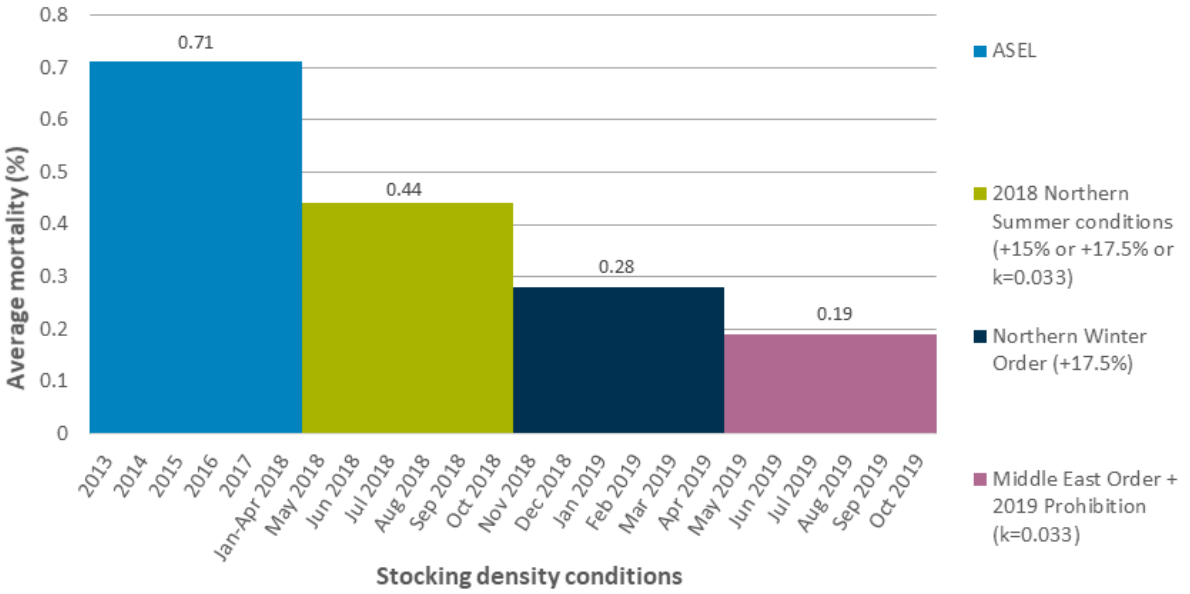
6.1 Option 2 benefits

This option reduces the risk of a heat stress welfare event and the consequential public and political pressure against the trade.

A prohibition would mean that sheep are not exposed to heat stress during the extreme temperatures of the Northern Hemisphere summer. Additional conditions under option 2 provide further risk reduction than the Middle East Order during the shoulder periods of the Northern Hemisphere summer further reducing risk of heat stress morbidity and mortality for exported sheep.

Although technical evidence can be difficult to quantify, 2019 voyages provided data about the number of mortalities under the prohibition, relevant for option 2. In 2019, under conditions of the Middle East Order and a prohibition from 1 June to 22 September, average voyage mortalities declined from 0.44% to 0.19% (Figure 4). This provides a conservative indication of the improved mortality outcomes, which in part reflects the decreased heat stress impacts that could be expected under option 2 compared with option 1.

Figure 4 Average sheep mortality compared with stocking density, 2013 to present



Option 2 also restricts the number of discharge ports, thereby reducing the time sheep are required to stay on vessels in the Persian Gulf. This lowers the cumulative heat load and possibility of encountering temperature extremes.

Shorter wool length and a moderate body condition score assist with tolerating hot weather and encourages selection of sheep with optimum heat tolerance characteristics, as well as improved management of pre-export shearing.

Collection of data under option 2 would provide information about onboard conditions that would assist in managing outcomes and informing future reviews of sheep export conditions.

Businesses impacted by the prohibition would be better prepared to operate under the new regulations before each Northern Hemisphere summer. A 3.5-month prohibition starting in June would still enable better farm management decisions into late autumn (albeit longer would be ideal from a farm management perspective) and a short enough period over which to supplementary feed if producers retain sheep on farm.

Stakeholder feedback has indicated some supply chain opportunities available to producers under option 2 including:

- preparing and selling suitable animals for export prior to the prohibition to prioritise pasture for lambing ewes, or selling to alternative markets after the prohibition
- retaining and selling sheep to the live export market following the prohibition—sheep need to be maintained at body condition score 2 or higher
- wethers in particular could be carried through by supplementary feeding on a light ration (LiveCorp 2020) at an additional cost to the producer
- selling lighter lambs to the air freight market

- retaining sheep for wool production in the longer term—adult sheep need to be maintained at body condition score 2 or higher for good health and wool production
- selling heavier merino lambs to slaughter while meat prices are good
- selling wethers to east coast markets as stores (LiveCorp 2020)
- retaining sheep and redirecting focus away from wool production to prime lamb production (over time)
- retaining merino lambs and hoggets and then selling as heavy weight mutton—sheep need to reach fat score 3.

Additionally, the restriction on trade may provide for sheep to be available for domestic sheep meat processing. Sheep meat processing capacity within Western Australia may be underutilised. Although industry indicates limitations to infrastructure and staffing, the department estimates the spare processing capacity within Western Australia to be around 2 million head per year. If these limitations could be addressed, the spare processing capacity would be sufficient to absorb additional sheep redirected to domestic production due to a prohibition in live exports. In the 3 years to 2017, 4,500 full-time staff were employed each year on average in the WA meat processing sector. The Pegasus Economics report commissioned by Animals Australia estimated that ending live exports could increase employment in the meat processing sector by 350 full-time employees (Davey and Fisher 2018).

In the absence of trade for the 3.5-month period, there would be no change for compliance costs to industry. Also, there would not be additional compliance costs associated with the requirement for no more than 2 ports of discharge for voyages arriving in the Persian Gulf during June and departing Australia between 15 and 30 September. Exporters and vessel operators would still go through the same regulatory processes for an export voyage to 2 destinations as they would to 1 or several.

The removal of the requirement for a HSRA for live sheep voyages to, or through, the Middle East would also reduce compliance costs for the Northern Hemisphere summer period. Exporters currently spend time filling out a HSRA for each voyage. The estimated cost savings in removing this requirement equates to a reduction in compliance costs of $3,824 (range of $1,912 to $7,648) each year.

6.2 Option 2 impacts

6.2.1 Regulatory impacts

Persian Gulf trading partners have expressed growing concern about Australian Government regulation of the trade and the impact it has on their businesses and food supply. Establishing a formal trade restriction period may lead to those countries establishing relationships with other trading partners, thereby reducing trade with Australia. Media reports indicate that some Persian Gulf markets may seek to stockpile Australian sheep to mitigate additional regulatory barriers and stakeholders have suggested there could be increased need for road transport of sheep from Kuwait to other Persian Gulf states. The department notes road transport and holding of sheep would require an approved ESCAS contingency arrangement. There was no evidence that Australian sheep were stockpiled ahead of the prohibition in 2019.

Industry groups voiced concern that the additional prohibition periods proposed in the draft RIS for Qatar and Oman would unnecessarily limit live sheep exports to those destinations. ALEC states 'the live sheep export trade is already under severe commercial pressure and any further restrictions to its operating capacity will continue to erode the sustainability of the industry'. The Pastoralists and Graziers' Association (PGA) states that Qatar accepts approximately one third of Australia's live sheep exports and that additional prohibition periods could 'drive importers to source sheep from other countries which could result in complete loss of the market.'

The exclusion of live sheep exports during the prohibition period would cause supply chain disruptions in the Australian market due to a greater number of sheep that would otherwise have been exported, being turned off in the domestic market. The reduction in live exports in 2018 and 2019 resulted in the number of lambs delivered to saleyards in WA increasing by 19% on average, with reduced prices obtained at sale. Estimates derived from ABARES farm survey data suggest that the cost of redirecting sheep to domestic markets is likely to add between 4% and 13% to the average annual operating costs of farms with sheep in Western Australia. As the department's analysis has been based on limited and mostly qualitative information from stakeholder feedback, the full extent to which supply chain disruptions and market impacts would occur is not known.

Mecardo (2018) estimated that if sheep currently exported live were slaughtered in Western Australia, sheep and lamb prices in Western Australia could fall by between 18 and 35%. This was projected to reduce farmers' revenues by between $80 million and $150 million. Option 2's prohibition is expected to result in a maximum saleyard price decline of 20% compared with option 1. This is based on the observation that the biggest differential would be limited by the approximate cost of transporting sheep from Western Australia to eastern states for slaughter. Transport costs are around $20 per head which is approximately 20% of the average 2017–18 saleyard price of wethers sold for live export. The 2018 and 2019 price declines relative to eastern state prices were consistent with this assumption.

LiveCorp's submission to the draft RIS noted that 'while a moratorium limits the chance of heat stress periods occurring, it has a significant impact upon participants within the live sheep export industry across the supply chain'. The department did not receive specific quantitative information on the impact of a 3.5-month period of no sheep exports to industry stakeholders, but some specific implications were raised and are outlined below.

Producers

Producers have advised that April to June is a particulary critical decision-making period in the sheep production calendar. The ability to sell sheep to the live export trade has provided an important risk management tool for producers at this critical time of year. This opportunity for producers would be reduced by implementing option 2.

Determining a profitability impact of the prohibition at the farm gate is complex. This is because of the range of alternative options available to producers and the intricacies of estimating 'average' production costs. Put simply, a prohibition of live exports will have impacts to profitability by requiring producers to seek less profitable alternatives to live export. The magnitude of this impact is likely to be greatest in early years following implementation of a prohibition, diminishing as production systems are reorganised and rationalised to meet the alternative activities. Arguably, this adjustment period has already begun with no sheep being

exported in June to August in 2018 and 2019 and the department flagging in the draft RIS a preference for a similar approach to continue.

A report commissioned by Animals Australia, by Pegasus Economics (Davey and Fisher 2020) suggests:

> the considerable structural change observed in the WA sheep flock over the last 30 years … is testament to the fact that WA sheep farmers are not stagnant and can adjust their business mix and model in response to changing market conditions and circumstances. We also note that the potential adjustments by WA sheep farmers to a 16 week prohibition on live sheep exports to the Middle East … do not appear to be extensive compared to other structural adjustments already undertaken by the industry. We thus concur [with the department] that the price impacts from the temporary withdrawal of live sheep exporters will, in all likelihood, dissipate over time.

As a second degree effect, switching from live exports to lamb production is likely to have only minor impacts on employment in the sheep industry. On-farm employment may increase. On one hand, the production of prime lambs requires more labour per sheep than producing sheep for live export. On the other, the reduction in cropping as a result of retaining pasture for prime lambs will require less labour. Some training may be required to assist transition of farm labour from cropping to animal husbandry tasks. The cost of these types of adjustments to the industry is unclear at this time.

Meat processors

Processing costs are likely to increase in the short term due to the increase in investment to recommission facilities that have fallen into disuse. These additional costs could include recruiting and training new staff and leasing temporary processing and refrigeration while refurbishing more permanent facilities.

The cost of processing would begin to fall once these initial investments have been made.

The duration of this price impact is uncertain—it depends on how quickly underutilised processing capacity can be brought back into production. Industry consultation suggests recommissioning of meat processing facilities in Western Australia could be complete within 36 months. Meat processing is a flexible industry which often operates seasonally and routinely adapts to quite large fluctuations in demand. The industry would be expanding well within past production capacity, and so can draw on previous experience and expertise. It is noted however that a constraint for the processing sector is a shortage of suitable labour. A survey of its processing members by Australian Meat Industry Council identifies the need for around 3,000 extra staff to work at full capacity (AMIC 2018).

Exporters and ship owners

Departmental records from 2013 to 2017 show the average number of sheep exported between 1 June and 15 September was 533,964 with a range of 24.8% to 31.6% of total annual exports. In simplistic terms, the 3.5-month suspension on live sheep exports in option 2 could reduce revenues derived directly from the export of sheep by approximately 30%. This does not consider alternative means of revenues that could be prioritised or alternative markets that could be accessed during a prohibition period, so the extent of the impact is difficult to determine.

Feed producers
Information provided by industry indicates that almost all of the feed for the live sheep export trade is supplied by 2 feed mills in Western Australia. Both of these mills are heavily invested in the trade with 1 major manufacturer allocating 77.5% if total feed production in 2019 and 87.4% of total feed production in 2018 to live sheep exports. For these mills, other sources of income may include production of feed for domestic use, sale and servicing of milling equipment.

Transporters
According to the LiveCorp submission to the discussion paper, the 2019 prohibition period reduced turnover and profitability of transporters, and had flow-on effects for managing employee numbers, although no numbers were provided. Transporters were identified as being 'most at risk and do not believe that they will have a financially sustainable business should the 3-month moratorium continue into the future'. Again, the extent of this specific impact is difficult to determine.

Shearers
Some industry bodies have noted a prohibition may distort the distribution of shearer's workload, resulting in an imbalance between strenuous work periods and no work.

Dalgleish and colleagues (2020) indicated that 'retention of staff, an already challenging feat for managers, has been made more difficult due to this gap in available work' and that 'in some cases, managers continued to pay contractors through the off-season (without them working), provided them with accommodation or attempted to find them casual on-farm work in efforts to retain staff'.

Livestock agents
LiveCorp's submission to the draft RIS states 'the agent's salary is a commission from the farmer based on the prices received for the stock sold. Thus a reduction in the number of buyers, diminished saleyard competition and fewer marketing options all contribute to lower prices received for stock and in turn, lower returns to the agent.'

6.2.2 Compliance costs
Compliance costs will be incurred by exporters to fulfil the requirement to equip vessels with environmental data loggers. The maximum cumulative cost would be approximately $808,500 (or $80,850 per year over 10 years). This equates to a cost of around $2,450 per year to each exporter.

6.3 Option 2 summary
Under option 2, there is increased confidence for the industry and community that welfare risks associated with heat stress are being effectively managed.

On the basis of available climatological and historical data, a 3.5-month prohibition ensures that sheep are not subjected to the high temperatures that cause heat stress during the hottest period of the year in the Middle East.

There would be some adverse impacts on the industry, particularly for producers who would lose some access to lucrative markets and from reduced flexibility to manage feed and stock. This option may lead to some supply chain disruptions that result in incentives for producers to

transfer sheep to less lucrative domestic markets. However, producers and other industry stakeholders affected by a prohibition have previously had 2 periods (2018 and 2019) to find alternative income and these supply chain disruptions may not be significant.

Option 2 also risks the potential loss of market share to other international competitors who apply less stringent animal welfare criteria, particularly as Middle East trading partners are seeking a regular supply source.

By permitting some trade of live sheep to the Middle East during the Northern Hemisphere summer, option 2 would assist to abate the political and diplomatic issues, but also address Australian community concerns about the trade. A 3.5-month prohibition provides grounds for a better relationship with trading partners than option 3's 6-month prohibition.

7 Benefits and impacts of option 3

Option 3 aligns with the outcome from a recommendation of the HSRA Review. Option 3 would place a prohibition on live sheep exports from 1 May to 31 October (Northern Hemisphere summer), until a workable revised HSRA model is available. Option 3 was amended to clearly outline the anticipated outcome from the HSRA panel's recommendation to implement a revised HSRA model, which would equate to a 6-month prohibition. This follows feedback from the DPIRD noting that the HSRA model is complex, and the assumptions that underpin its use are not available to state or territory governments or members of the public.

The HSRA panel identified that a revised HSRA model should replace risk settings based on mortality thresholds with welfare thresholds (Appendix H). The welfare thresholds recommended by the HSRA panel align with heat stress thresholds (HSTs) already embedded within the existing HSRA model (but not currently used).

The current HSRA model is owned by industry and would require an industry undertaking to revise it. A revised HSRA model for option 3 does not yet exist but analysis indicates that a revised HSRA model for heat stress thresholds is expected to completely destock or heavily reduce stocking densities on voyages from 1 May to 31 October. Therefore, a 6-month prohibition is proposed in option 3 as it is anticipated that implementation of a revised HSRA model would effectively prohibit sheep exports for the entire Northern Hemisphere summer.

7.1 Option 3 benefits

Option 3 reduces the risk of heat stress in exported sheep to an extremely low level. It provides the optimum animal welfare of the 3 proposed options, as it is unlikely any sheep would be exported from May to October each year, even after revision of the HSRA model. Analysis indicates that a revised HSRA model is expected to completely destock or heavily reduce stocking densities on most, if not all, voyages from 1 May to 31 October. Therefore, prohibiting sheep exports for 6 months of the year, the entire Northern Hemisphere summer, would be consistent with the implementation of a revised HSRA model recommended by the HSRA review.

Under this option, the possibility of poor animal welfare outcomes due to heat stress on voyages to, or through, the Middle East during the Northern Hemisphere summer period is zero. This provides the greatest reduction in risk in comparison to option 1 and a moderate additional reduction in risk when compared with option 2.

According to the RSPCA Australia, option 3 'presents the greatest net benefit, as options 1 and 2 continue to expose sheep to unacceptable levels of heat stress risk and suffering, which is not compatible with the industry's sustainability'. Submissions from animal welfare advocates in the Australian community most strongly supported option 3.

In the absence of trade there would be no compliance costs to industry for the 6-month prohibition period. Noting that when a revised model becomes available, additional costs may apply, if that model supports exports during the Northern Hemisphere summer.

7.2 Option 3 impacts

7.2.1 Regulatory impacts

The concern expressed by Persian Gulf trading partners would be magnified further by the impact of a longer prohibition period on their food security and certainty of supply. This impact is not currently quantifiable. Exporters' commercial relationships and trading reputations could be more seriously damaged by the inability to service demand for half the year. One importer noted that option 3 would result in sheep exports from Australia becoming economically unviable as the cost of sheep production in Australia would increase above the level that alternative suppliers could offer. As this statement was not supported by data, the actual economic impact is not known. During the prohibition of 2019, Middle Eastern importers sourced sheep from other countries including South Africa, Romania, India, Somalia, Spain and Jordan. As discussed in section 6.2.1, the extent to which option 3 would impact Australia's relationship with trading partners and lose sheep meat market share is unknown, but this detrimental effect would be greater under option 3 than under the shorter prohibition of option 2. It is possible that due to Australia's inability to service demand for half of the year, Middle Eastern importers may source sheep from other countries on a permanent basis to ensure sustained food supply and commercial relationships.

Possible stockpiling of imported sheep in importing countries may also occur. However, there is no evidence that it occurred in 2018 or 2019. Under option 3, the supply of Australian sheep would be cut-off for longer. This could either lead to markets securing alternative supplies, therefore reducing this risk, or increasing the risk due to the longer period. If stockpiling occurs there may be subsequent animal welfare impacts, however, the evidence is insufficient to determine if this would be larger or smaller than in option 2. Approved ESCAS arrangements would also apply, mitigating the risk that sheep would be held in unsuitable facilities. Similar supply chain disruptions and market impacts as anticipated for option 2 would occur under option 3 but are likely to be proportionally greater. However due to limited quantitative evidence, the actual cost to industry is not known.

An extended prohibition period of 6 months over option 2's prohibition of 3.5 months would also have impacts on world and domestic sheep markets. If sheep that would otherwise have been exported live during the Northern Hemisphere summer were processed domestically, the department estimates the increase in sheep meat supply out of Australia could have <1% impact on world prices. However, domestic WA prices would also be expected to decline by a maximum of around 20% due to the price floor provided by the option to deliver stock to the eastern states for approximately this amount. Further discussion on price impacts is in section 6.2.1 and Appendix I. It is expected that these price impacts would continue beyond the suspension period each year, with more impact than option 2.

Feedback from producer groups and industry bodies to the discussion paper and draft RIS indicated that while a shorter 3.5-month prohibition (option 2) was a viable option, a longer prohibition of 6 months (option 3) would compromise the viability of the entire trade and the business model for a large proportion of sheep producers in Western and South Australia. The actual costs for producers and supply chain participants of a longer prohibition under option 3 compared with option 2 were not provided in any submission.

There would be a longer period of interruption to business activities for supply chain participants. Based on the difference in timeframe, the impact could crudely be estimated to be a

multiple of 1.7, compared with option 2. Some sheep export consignments may be rescheduled to occur outside the prohibition so the actual impact is not expected to be linear, however, a transition period of lower income and profitability can be expected.

A 6-month prohibition would require earlier, less-informed decision-making ahead of the usual timing of the break in the season, which may limit farmers' ability to seek the most profitable option for that year. A decision to hold stock on the expectation of rain that does not occur could mean longer dependance on costly supplementary feeding or selling stock earlier than desired to processors at reduced prices. During consultation, no quantitative evidence was provided to show the financial impact of these outcomes.

Consultation showed there was general scepticism by industry that local meat processing facilities could cope with the increased turn-off that would occur as a result of a prolonged (6 month) prohibition. There was scepticism of the department's estimate that the spare processing capacity in Western Australia is around 2 million head per year and suggestion that local slaughter capacity could not meet increased demand during spring and summer. Predicted effects of not having enough local slaughter capacity included that farm gate return would be further reduced by the need to truck sheep.

Industry submissions raised wider reaching implications of a 6-month prohibition of live sheep exports including impacts on natural resources from overgrazing and animal welfare issues from malnourishment during drought when producers do not have the option of live export as a 'relief valve'. Some industry bodies stated their concern that extending the prohibiton period from 3.5 months to 6 months will speed up the decline in the number and quality of available shearers. Additionally, stakeholders noted that with the national flock at its lowest point in 100 years, sufficient numbers of producers exiting the industry due to reduced profitability could risk the sustainability of the national and WA flock, impacting wool and sheep meat production potential, as well as the retention of breeding genetics.

7.2.2 Compliance costs

The main compliance cost involves undertaking the technical revision of the HSRA model so it becomes implementable.

Industry has estimated the required revision is not expected to be especially burdensome with an estimated cost to industry of $100,000. It is expected that this task will be undertaken by LiveCorp under its research and development program which is funded 50% equally by levies paid by live animal exporters and by government. The data necessary for the revision is already embedded in the model but is not currently accessible to users.

7.3 Option 3 summary

Under option 3, there is increased confidence for the industry and Australian community that animal welfare risks associated with heat stress are being managed to a high level.

Although a 6-month prohibition of live exports best manages the risk of heat stress on Northern Hemisphere summer voyages with a negligible risk approach, this would create more challenges with trading partners than the other options. On balance, there would be a greater burden on industry and compromise to the viability of the trade.

On the basis of available climatological and historical data, a 6-month prohibition would cover additional periods of the year that had a low probability of sheep being subject to high temperatures. This would guarantee that sheep are not subjected to the high temperatures that cause heat stress during the Northern Hemisphere summer.

There would be adverse impacts on the industry particularly for producers who would likely lose access to potentially lucrative markets and reduce the flexibility to manage supplementary feeding and stock. This option is likely to lead to supply chain disruptions that would result in sheep being transferred to less lucrative domestic markets in the short term and lower sheep flock numbers in the long term. While producers and other industry stakeholders affected by a prohibition have previously had 2 periods in 2018 and 2019 to find alternative income, option 3 would create further disruption and loss of income.

Option 3 also risks the potential loss of Australia's market share to other international competitors who apply less stringent animal welfare criteria, particularly where Middle East customers are seeking a regular supply source.

Option 3 would assist to abate the political and diplomatic issues arising from community concerns about the trade and provide grounds for a better relationship with trading partners.

8 Consultation

Reform of Australia's live sheep export framework would affect a range of stakeholders throughout the live export supply chain. The department has undertaken extensive and inclusive stakeholder consultation during the RIS process as outlined in section 8.2 and Appendix J. Stakeholder feedback during public consultation has informed the development of this RIS.

There were a number of purposes and objectives of consultation. The department wished to develop a sound understanding of the benefits and impacts of each proposed policy option for all businesses involved in the supply chain, as well as individuals and communities. The department also sought to gauge levels of support for policy options from the Australian community.

Throughout consultation, stakeholders demonstrated that there was support for improving the regulatory framework relating to live sheep exports to, or through, the Middle East during the Northern Hemisphere summer. Feedback has also provided the department with a better understanding of the potential benefits and impacts of proposed regulatory options.

8.1 Key stakeholders

Throughout the department's consultation processes these stakeholders have been, and will continue to be, consulted:

- animal welfare organisations
- Australian Maritime Safety Authority
- exporters
- general public
- international trading partners
- live export related industry personnel including and recurring road transporters, feed millers, shearers and stockpersons
- peak industry and industry-related bodies
- producers
- ship owners
- research organisations and academics
- state and territory governments
- veterinarians, including AAVs.

8.2 RIS consultation process

The department has undertaken a wide variety of continuous and recurring consultation, engaging with a range of stakeholder groups over an extended period of time to inform the development of options presented in the RIS, including RIS-specific consultation and previous related consultation processes.

During the RIS-specific consultation, these forms of consultation ensured a wide-reaching, transparent and efficient process:

- A formal written submission process on the draft RIS.
- A formal written submission process on the Middle East sheep exports policy options discussion paper.
- Industry roundtables with peak bodies and stakeholder groups such as the WA Live Export Reference Group (LERG).
- Meetings with exporter representatives in Perth in October 2019 and January 2020, in Townsville in October 2019 and in Adelaide in January 2020.
- Targeted face-to-face or teleconference meetings with stakeholders such as Animals Australia, the ALEC, the Australian Veterinary Association (AVA), LiveCorp, the RSPCA Australia, the Western Australian Livestock Exporters' Association (WALEA), the department's Livestock Export Animal Welfare Advisory Group, and state and territory governments.

8.2.1 Consultation on the draft RIS

On 20 December 2019, the department released a draft RIS on the department's Have Your Say webpage as the second stage of the RIS-specific formal written submission process. The draft RIS proposed 3 policy options and invited submissions considering key questions:

- For each option, what would be the financial benefits and/or impacts on you, your organisation and the community?
- For each option, are there any non-financial benefits and/or impacts on you, your organisation and the community?
- Which option do you prefer? What benefits and/or impacts does your preferred option provide over the other options?
- Can you assess the impacts or benefits of option 2 compared with option 3 on you, your organisation and community?
- Would Australia's live export industry be significantly disadvantaged by any of the options? If so, which option(s) and why?
- Can you provide any information about the flow-on effects of implementing each option, which has not been considered in this draft RIS?
- Are there any other factors you feel the department has not considered?

Consultation on the draft RIS concluded on 3 February 2020 and the department received 21 submissions and over 1,400 RSPCA Australia templated campaign responses.

8.3 Outcomes of consultation

Throughout consultation and engagement, the department has observed significant community concerns regarding animal welfare, as well as widely divergent views on the live sheep export trade.

8.3.1 Submissions to the draft RIS

The majority of submissions to the draft RIS supported some form of prohibition, with varied opinion on the most appropriate duration for a prohibition and the additional conditions applied during shoulder periods. Some welfare groups and members of the public held the view that positive animal welfare can only be safeguarded by a permanent cessation of the trade, or at least a prolonged prohibition during the entire Northern Hemisphere summer, from May to October inclusive. Industry groups were generally supportive of a 3.5-month prohibition from June to mid September, accepting or proposing amendments to the additional conditions applied during shoulder periods.

Most submissions were supportive of a revised HSRA model based on animal welfare rather than mortality. Welfare groups typically supported a revised HSRA using HSTs, in line with the recommendations of the McCarthy and HSRA Reviews, while industry groups were generally supportive of a revised HSRA model based on more direct animal welfare indicators rather than HSTs. Some submissions called for a revised HSRA model in conjunction with a prohibition period.

The support for proposed options in the draft RIS is outlined in Table 1. It is noted that alternative options proposed by stakeholders were not considered by all stakeholders and therefore the department is not necessarily aware of other stakeholders' views of these options.

The department identified key topics of debate that were regularly raised in submissions and in face-to-face meetings. These topics and other consultation processes are discussed in more depth in Appendix J.

Table 1 Support for options proposed in the draft RIS

Option	First preference support	Second preference support	Not supported
Options proposed in the draft RIS			
Option 1	Pastoralists and Graziers Association, producer, Widam Food Company (Qatar)	–	Animals Australia, Australian Livestock Exporters' Council, Australian Veterinary Association, Department of Primary Industries and Regional Development, LiveCorp, Live Export Reference Group, RSPCA Australia, Sheep Producers Australia, unspecified industry group
Option 2	Australian Livestock Exporters' Council, Department of Primary Industries and Regional Development, LiveCorp, Live Export Reference Group, National Farmers' Federation, Sheep Producers Australia, unspecified industry group	Pastoralists and Graziers Association, unspecified industry group	Animals Australia
Option 3	unspecified industry group	–	LiveCorp, Live Export Reference Group, Pastoralists and Graziers Association, Sheep Producers Australia, unspecified industry group
Alternative options proposed by stakeholders			
Combination of options 2 and 3	Australian Veterinary Association, RSPCA Australia, Vets Against Live Export	–	–
Alternative options (including alternative prohibition periods or a total ban)	Animals Australia, Edgar's Mission, Sentient, 3 members of the public	–	–

9 Preferred option

The Middle East Order has reduced the risk of a heat stress event. However the likelihood of temperatures rising above the level required to cause such an event at any time during the period from late May to mid September (depending on location) remains 5% or greater. Option 1 has the greatest risk of unacceptable animal welfare outcomes and of a significant heat stress event that could threaten the viability of the industry, through pressure on government to suspend or shut down the trade. Under options 2 and 3, there is increased confidence for the industry and the Australian community that welfare risks associated with heat stress are being effectively managed.

Option 2 would have some adverse impacts on industry, particularly for producers who would lose some access to potentially lucrative markets, and by reducing the flexibility to manage feed and stocking levels through the year. This option may lead to some supply chain disruptions that result in incentives to transfer sheep to less lucrative domestic markets. However, for option 2 these would be limited because some adaptation by industry has already occurred through the Middle East Order, and the voluntary standstill during 2018 and prohibition in 2019. Option 3 is likely to have greater adverse impacts on producers and the industry as a whole.

Option 2 also risks the potential loss of market share to international competitors who apply less stringent animal welfare criteria, particularly because Middle East trading partners are seeking a regular supply source. The risks for loss of market share are higher for option 3.

The department's analysis of the available information indicates that option 2 is likely to result in a lower economic impact than option 3 and in improved animal welfare outcomes compared with option 1. Option 2 would also result in a considerably reduced risk of a significant heat stress event which could threaten the viability of the industry, compared with option 1. Therefore, option 2 is recommended by the department.

10 Implementation and evaluation

10.1 Implementation approach

The improved regulatory framework will be implemented in a new order by the Secretary under Section 17 of the *Australian Meat and Live-stock Industry Act 1997* (AMLI Act) by 1 May 2020. Section 17 of the AMLI Act confers on the Secretary the power to make orders with which the holders of export licences must comply. The proposed period of prohibition and additional conditions are all supported by the AMLI Act.

Notably, conditions set by the Australian Meat and Live-stock Industry (Export of Sheep to the Middle East) Order will remain in place as a baseline regulation. In addition, exporters are required to comply with the standards set out in the ASEL, which are enforceable under the Australian Meat and Live-stock Industry (Standards) Order 2005 made under Section 17 of the AMLI Act.

Interim conditions that were put in place for 2019 only, pending completion of this RIS, have now expired and will not form part of the new legislative framework. These existing orders are no longer required and the department intends that they will be repealed as a matter of good practice by a provision in the new order. The orders to be repealed are:

- the Australian Meat and Live-Stock Industry (Prohibition of Export of Sheep by Sea to Middle East – Northern Summer) Order 2019, and
- the Australian Meat and Live-Stock Industry (Export of Sheep by Sea to Middle East) Amendment (Northern Summer) Order 2019.

Following appropriate and transparent consultation with all stakeholders, the proposed prohibition period and additional conditions in option 2 will be implemented. The chosen option most effectively addresses the Australian public's expectations for permanent action to improve animal welfare during live sheep export by limiting heat stress, while also supporting sustainability of the live sheep trade and those dependent upon it.

Implementation of the new legislation will take into account:

- the complexity of the live sheep export markets
- the sensitivities of international trading partners to change in the trade
- potential domestic impacts caused by rolling out the framework.

10.1.1 Implementation challenges

The department has identified and is managing key risks that could affect implementation of the improved legislative framework. Additionally, the department has been working with stakeholders throughout the RIS process to ensure they are prepared for the ensuing changes.

One of the challenges to implementation is that the new order must be carefully prepared to ensure it is 'fit for purpose'. This ensures the requirements are clear and workable and the desired outcomes are achieved. It must also support export policy and operations currently in place, while avoiding unintended consequences. Exporters must be able to continue to operate

without significant disruption over the transition and trading partners should not experience issues with export certification issued under the new legislative framework.

Prior to finalisation of the new legislative framework, the department will undertake a range of implementation activities, including ongoing engagement with internal and external stakeholders. Engagement will be via face-to-face meetings, teleconferences and publication on the department's website. This will assist with a seamless transition and business continuity once the new order takes effect. The department has committed to continuing to engage with stakeholders during the development and implementation of the new legislative framework to ensure there are no unintended consequences arising from the improved legislation and so the transition to the new order is seamless.

Drafting and consultation on the requirements will require a significant time and resource commitment from the department. If resources cannot be committed, or timeframes slip, there is a risk that the legislative framework will not be fit for purpose when the new order commences. It is also essential the new order be in place ahead of the 2020 Northern Hemisphere summer so industry is prepared.

In addition, stakeholders will be engaged in the ongoing management of the framework, including through established industry consultative committees. These committees will provide a mechanism to monitor the effectiveness of the new framework on an ongoing basis.

10.1.2 Implementation risks

The most significant risk from poor implementation of the improved legislative framework is that it does not appropriately manage welfare of live sheep exported to the Middle East. This would negatively impact public perception of the live sheep export industry and the department.

Another important implementation risk is disruption to Australia's trade. Trade disruptions can result in immediate revenue loss, short-term and long-term loss of market access for Australian exports, and damage to Australia's trading reputation. Some disruption to trade is anticipated with implementation of the new order. However, industry has already experienced 2 non-trading periods during 2018 and 2019, so has been exposed to most of the issues arising from a prohibition in the live sheep export trade over this period. The department will continue to provide tailored communication to trading partners to clarify the regulatory changes.

There is a risk the new order will not be implemented by 1 May 2020. This has a low likelihood of occurring if appropriate risk mitigation management is applied, but would result in reputational damage to the Australian Government and the department due to stakeholder dissatisfaction and concern about the ability of the department to fulfil its duty as a regulator of industry. The department has commenced the process of developing a new order early to ensure sufficient time for internal stakeholder reviews and to have adequate resources for implementation activities. Within the department, governance processes will be followed including regular process checks and other monitoring activities.

The department is aware not all stakeholders will fully support the new legislative framework and implementation activities. Due to the polarised views of various stakeholders, the regulatory options for the live sheep export trade cannot encompass the opinion and needs of every stakeholder. The department has selected the preferred option to mitigate risks for animal welfare and trade in the most balanced manner. There may be some reputational damage to the

department as a result of stakeholder dissatisfaction and some potential adverse impacts on trade. The department will continue to engage stakeholders during the implementation of the new order to raise awareness of the improvements and identify any concerns and issues. This will include with industry representatives, trading partners and members of the public. The department will regularly assess the effectiveness of its communication and approach to ensure effective engagement.

Work to validate the operation of the new framework will be ongoing throughout its early implementation. Should it be required, the Australian Government could amend the new order, or make an additional order, to address any legal or functional issues that emerge before the prohibition period ends for 2020, or at any stage after implementation. This includes ensuring the order remains 'fit for purpose', particularly by addressing animal welfare of sheep during export.

10.2 Communications strategy

A communication strategy will provide support to build on engagement and communication activities. Engagement and communication activities may include briefing key government, industry and non-government stakeholders, utilising Australia's diplomatic network, including the department's agricultural counsel in Dubai, to liaise with trading partners, and other communication activities as appropriate.

The communications strategy may include information sessions or forums (including with industry consultative committees), supporting materials (web content, export advisory notice), and use of existing channels to deliver messages including state and territory governments, industry associations and non-government bodies as necessary.

10.3 Monitoring and evaluation

Experience from the development and implementation of other legislative reforms in the department has been reviewed and taken into account in the project planning of this reform.

The department proposes to review the implementation of the new regulatory framework and report back to stakeholders after sufficient time has passed in which to evaluate the effectiveness of the approach. This is proposed to be by an informal interim review in late 2020 and then a more formal review after the 2021 Northern Hemisphere summer.

Development and implementation of the improved legislative framework will continue to be monitored by the Live Animal Exports Division, Animal Welfare Branch. Reports will also continue to be provided to the department's Executive Management Committee, chaired by the Secretary, which has oversight of all departmental activities and resources.

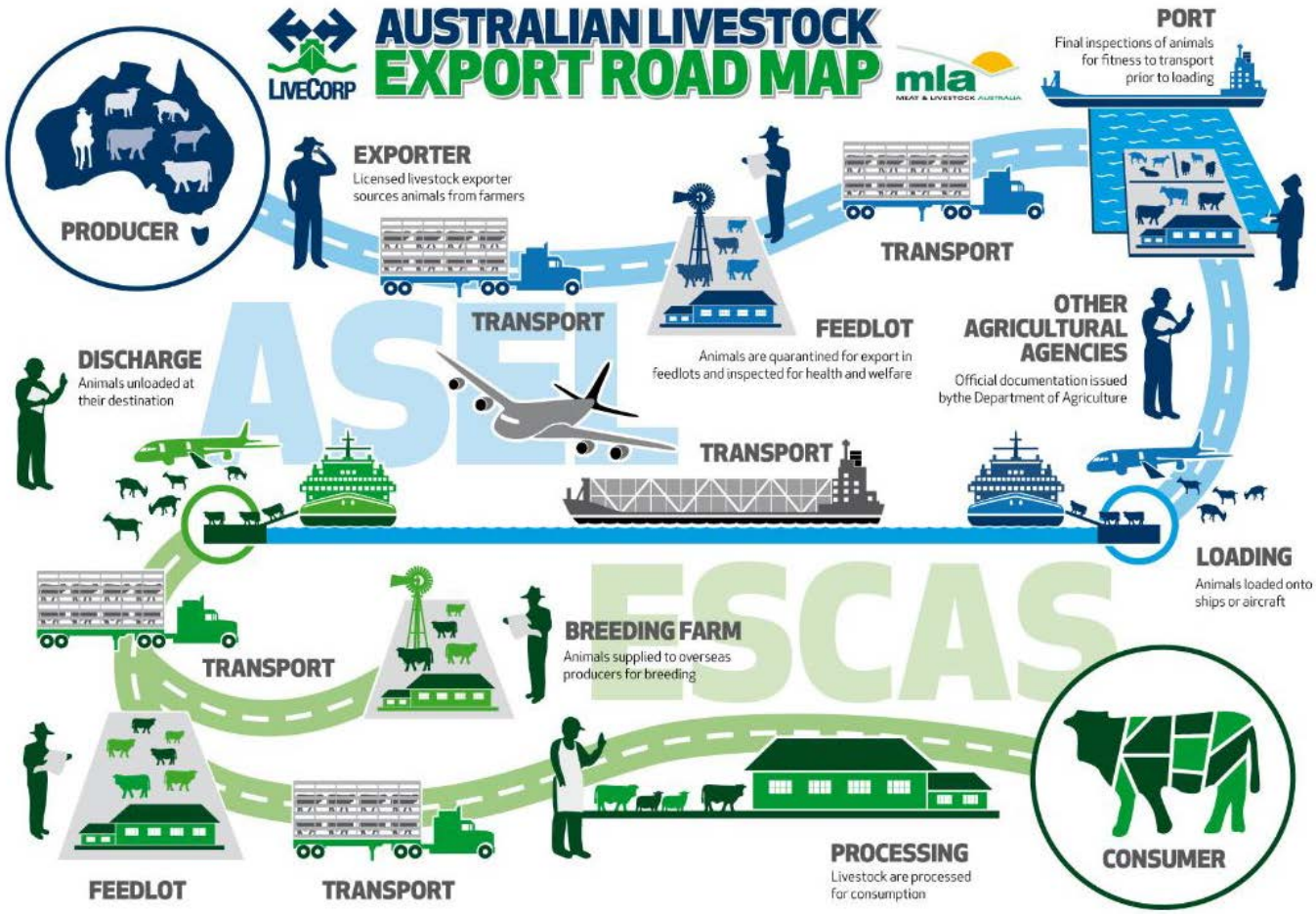
The department acknowledges there is ongoing research into heat stress management and that new science and technology, (including updates to the HotStuff model), could provide valid alternatives to the policy established as a result of this RIS process. New developments in heat stress management during live export of sheep will be considered as they become available and if appropriate, be implemented.

A growing body of research is being conducted into more targeted methods to address heat stress risk in sheep. This includes further work into animal welfare indicators and ship conditions experienced by the sheep under different climatic conditions. As such outcomes of

this RIS will be reviewed after 2 Northern Hemisphere summer periods (end of 2021). The review will consider whether the stated objective has been achieved and also whether new science has been uncovered.

Appendix A: LiveCorp export road map

Figure A1 LiveCorp export road map



Source: LiveCorp and Meat and Livestock Australia

Appendix B: Overview of WA sheep production industry

According to the DPIRD, the sheep industry contributes more than half of the gross value of agricultural production from all livestock industries in Western Australia.

Western Australia produces 22% of Australian fine wool, and wool contributes around $900 million annually to the state. According to the LERG, 85% of the state's ewe flock are pure merino. Co-products of the predominantly merino wool-based system are young merino wethers. Merinos mature more slowly than meat breeds and do not usually reach the weight and fat score requirements of the prime lamb market without supplementary feeding. Merino wethers are however, well within the body condition requirements for the live export trade.

The WA merino ewe flock also produces most of the prime lamb and mutton when crossed with a terminal sire. The DPIRD Sheep Producer survey in 2018 showed that only 9% of sheep producers in Western Australia identify as dedicated prime lamb producers, with sheep producers tending to run their flocks in conjunction with other enterprises, such as wool or grain production, on mixed enterprise farms.

Western Australia has a Mediterranean climate with hot, dry summers resulting in a short growing season. This means in a typical season, the quality of pasture begins to decline in October or November. Autumn rains bring the 'break in the season' usually around April or May. This is a critical decision-making period for producers when they decide whether to sell or retain non-breeding stock over winter, depending on timing of the season break and expected quality of winter pasture growth. According to the LERG submission to the discussion paper, Victoria and southern New South Wales have a much longer growing season and hence a greater suitability for specialist prime lamb production. In this context, the live export market represents a profitable alternative to producers in Western Australia, if seasonal conditions are not favourable.

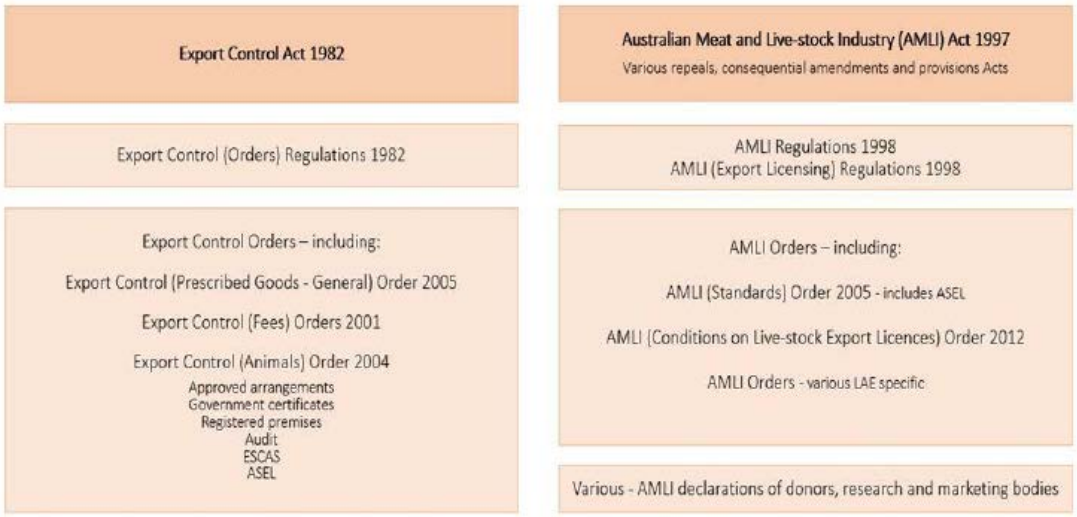
Appendix C: Regulatory framework

The department is responsible for regulating the livestock export industry including Australian Government livestock export legislation, animal welfare standards, control and traceability requirements, and importing country requirements. The regulatory framework for the export of livestock is governed by the *Export Control Act 1982*, the *Australian Meat and Live-stock Industry Act 1997* (AMLI Act) and associated orders, regulations and standards (Figure C1). The ASEL and the ESCAS promote animal welfare from sourcing of livestock for export through to slaughter in the importing country. The AMLI Act defines livestock as 'cattle, calves, sheep, lambs, goats or other animals prescribed for the purposes of this definition'. Other livestock animals often include camelids and deer.

The issuing of a livestock export licence is governed by the AMLI Act, the Australian Meat and Live-stock Industry (Export Licensing) Regulations 1998 (Export Licensing Regulations) and the Australian Meat and Live-stock Industry Regulations 1998 (AMLI Regulations).

The Australian Meat and Live-stock Industry (Standards) Order 2005 and subsection 17(5) of the AMLI Act, requires livestock export licence holders to comply with the ASEL (version 2.3) as a condition of the livestock export licence. The ASEL represent the minimum animal health and welfare requirements for the conduct of the livestock export industry that the Australian Government expects industry to meet.

Figure C1 Regulatory framework summary—export of livestock



Australian Standards for the Export of Livestock

The first Australian Livestock Export Standards were developed in 1996–97 by industry. These were in place from 1998 until 2005, when the first version of the ASEL was released, following a recommendation made by Dr John Keniry in his 2003 review of the live export trade. Since that time, the ASEL has set the animal welfare standards for the export of livestock from Australia by sea and by air.

The ASEL is given effect under the Australian Meat and Live-stock Industry (Standards) Order 2005, and is referenced in instruments including the Export Control (Animals) Order 2004. Exporters must comply with the ASEL to be permitted to export livestock by the Department of Agriculture, Water and the Environment.

Four versions of the ASEL have followed since 2005, with the current version, the ASEL (version 2.3), in place since 2011. It covers the major steps along the livestock export supply chain, including:

- sourcing and on-farm preparation of livestock
- land transport of livestock for export
- management of livestock at registered premises
- vessel preparation and loading
- onboard management of livestock
- air transport of livestock.

The standards currently apply to exports of cattle, sheep, goats, buffalo, deer and camelids.

The ASEL require compliance with Australian Government livestock export legislation, state and territory legislation, including animal welfare legislation, and animal codes of practice.

The last significant review of the ASEL was undertaken in 2012–13, following the Independent Review of Australia's Live Export Trade conducted by Mr Bill Farmer AO (the Farmer Review). The review was undertaken by a steering committee made up of representatives from state and territory governments and animal welfare, veterinary, livestock producer and industry representative organisations. The steering committee provided its final report in May 2013, recommending improvements to both the content and format of the standards and providing a draft version of the standards with several unresolved issues. The draft standards were not implemented.

The most recent review of the ASEL (for exports by sea) concluded in March 2019. The ASEL technical advisory committee was appointed to conduct the review to ensure the standards remained fit for purpose and continued to be supported by the latest scientific research.

The review made 49 recommendations, including some that addressed HSRA. The recommendations propose a number of conditions until such time as a revised HSRA has been developed. Excluding the expectation of a revised model, there are no changes to HSRA requirements for live sheep voyages. Recommendations specific to sheep include:

- Recommendation 21: That, for sheep voyages between 1 May and 31 October, the standards require the space allowance to be calculated using a k-value of 0.033 until a new HSRA model is in place based on heat stress welfare indicators rather than mortality (noting that this is subject to a separate review process). Once such a HSRA model is in place, the standard should be revised to adopt the default space allowance for sheep using a k-value of 0.030.
- Recommendation 27: That the standards be revised over time to require the application of an agreed HSRA to all livestock voyages that cross the equator, at all times of the year, from

all Australian ports. This requirement will require significant model development and a staged implementation approach.

- Recommendation 28: That once the (separate) review of the HSRA model for sheep exports to the Middle East is completed, the testing criteria in the standards should be revised to support the new model.

The department supported all recommendations in full or in principle, and the next version of the ASEL (version 3) will be implemented in 2020.

Exporter Supply Chain Assurance System (ESCAS)

The ESCAS is an assurance program under the Export Control (Animals) Order 2004. It applies to live export of feeder and slaughter animals to all markets. The ESCAS is used to monitor and ensure:

- animal handling and slaughter in the importing country conforms to World Organisation for Animal Health (OIE) animal welfare recommendations
- the exporter has control of all supply chain arrangements for livestock transport, management and slaughter, with all livestock remaining in the supply chain
- the exporter can trace all livestock through the supply chain
- the supply chain in the importing country is independently audited.

Through these principles, improved animal welfare outcomes are achieved in-market.

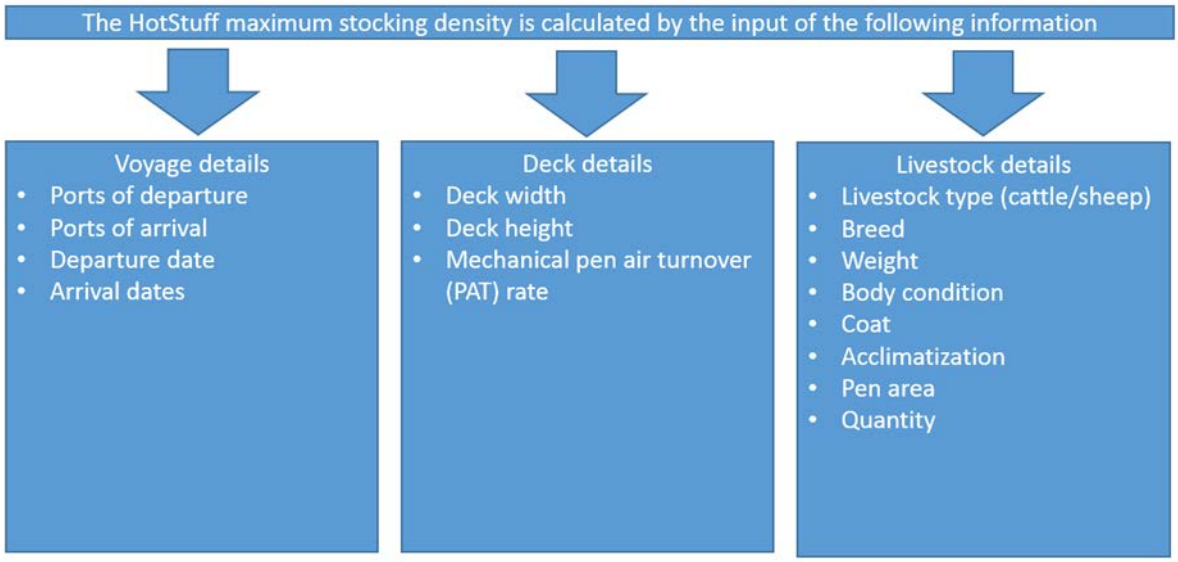
Appendix D: Heat stress risk assessment

In early 2000, after a series of voyages with high levels of heat stress and mortality in livestock, industry moved to develop a scientific method to determine the risk of mortality for export voyages to, or through, the Middle East. A predictive heat stress model was developed to assist in risk management planning, named HotStuff.

Version 4 of HotStuff combines naval and land-based weather data from 2002 to 2010 inclusive, vessel configuration (including ventilation parameters), voyage and livestock data (Figure D1). HotStuff is designed based on the principle of altering stocking densities and adjusting for the time of year in order to allow sufficient space for airflow and heat removal from livestock vessels, factoring in the heat generated by animals themselves. These adjustments limit conditions experienced by livestock to agreed risk parameters.

Deck conditions are determined by the ambient temperature, the metabolic heat produced by the livestock on deck and the ship's ventilation rate for that deck. Adjustments to stocking densities by the model limit metabolic heat production to ensure deck conditions experienced by livestock remain within agreed risk parameters.

Figure D1 HotStuff inputs



Source: Maunsell 2003

The HSRA model uses the environmental measure WBT to indicate the capacity of livestock to shed heat. The WBT is the temperature read by a thermometer covered in a water-soaked cloth or by equivalent electronic devices. It takes into account air temperature and humidity, but also varies with air pressure and elevation. The evaporation of water from the thermometer has a cooling effect, so the WBT is usually lower than the air temperature. When the air is full of water

vapour (100% humidity) there will be no evaporation and no cooling effect, so the WBT will be equal to the air temperature.

WBT has been shown to be the most useful measure related to heat stress in a shipboard environment as it most closely influences the physiological impacts of heat load on the animal. If there is effective ventilation, hot and humid air is blown away from the animals, providing capacity for both convective and evaporative cooling (Barnes et al. 2019).

The probability of animal mortality is described statistically as a function of WBT by a distribution that is a function of the animal's characteristics. The acceptable level of risk, as calculated by HotStuff, was agreed with industry in 2003 as a 2% risk that adverse weather conditions would cause a 5% mortality event.

Export Advisory Notice 2012–08 identifies HotStuff (version 4) as the current agreed model for conducting HSRAs. HotStuff (version 4) is a model belonging to the industry body LiveCorp and thus, this organisation has the responsibility to maintain HotStuff.

The McCarthy Review noted it is time for the industry to place the focus on animal welfare and move away from measures that use mortality as a benchmark. Reportable levels, voyage success and risk parameters have all been based around mortality. It was envisaged by the McCarthy Review that a new operating model will replace mortality with a raft of welfare measures and involve a quantum shift in attitude and behaviour (McCarthy 2018). Work to develop this model is underway.

Revised HSRA model based on HSTs

The revised HSRA model would assess the likelihood that a particular welfare temperature threshold would be breached. The HSRA Review recommended adverse sheep welfare, due to heat, be measured against a wet bulb temperature (WBT) welfare threshold instead of a mortality limit. The review's Technical Reference Panel (panel) advised that these WBT welfare thresholds were consistent with the HSTs currently embedded in HotStuff (version 4), but that the model would require revision before its application. The recommendations suggested that the revised HSRA model should limit the likelihood to a 2% chance that deck temperatures would exceed a sheep's WBT welfare threshold (or HST). By comparison, the existing HSRA model (in option 1) uses risk parameters of a 2% chance that deck WBTs will reach a level that would result in a 5% mortality incident.

Determining the actual impact of a revised HSRA model based on HSTs is not straightforward. However, industry research papers provide some guidance on the underlying calculations and assumptions (Maunsell 2003, Stacey 2017). Using these resources, the department has modelled the impact of the revised model on permitted stocking densities for 3 different classes of sheep (Figure D2). The impacts on expected stocking densities, defined by the model, are shown as a proportion of space requirements under the ASEL (version 2.3).

Figure D2 Expected stocking rates for 3 classes of sheep, under the revised HSRA model as a percentage of the ASEL (version 2.3) requirements

Sheep class	Destination	May	Jun	Jul	Aug	Sep	Oct
40kg merino adult, shorn, zone 3	Kuwait	0%	0%	0%	0%	0%	40%
	Qatar	0%	0%	0%	0%	0%	20%
	UAE	0%	0%	0%	0%	0%	40%
	Turkey	0%	0%	0%	0%	0%	20%
	Jordan	0%	0%	0%	0%	0%	20%
52kg merino adult, shorn, zone 3	Kuwait	0%	0%	0%	0%	0%	20%
	Qatar	0%	0%	0%	0%	0%	0%
	UAE	0%	0%	0%	0%	0%	20%
	Turkey	0%	0%	0%	0%	0%	0%
	Jordan	0%	0%	0%	0%	0%	0%
40kg awassi, zone 3	Kuwait	20%	0%	0%	0%	0%	80%
	Qatar	20%	0%	0%	0%	0%	70%
	UAE	50%	0%	0%	0%	0%	85%
	Turkey	40%	0%	0%	0%	0%	60%
	Jordan	40%	0%	0%	0%	0%	60%

Stocking rates
81-100%
61-80%
41-60%
21-40%
1-20%
0%

This analysis includes consideration of heat tolerant breeds of sheep (such as Awassi breed) as a comparison to the more commonly shipped merino breed. The analysis shows that the revised HSRA model would have the impact of effectively stopping live sheep exports for the Northern Hemisphere summer period, from May to October inclusive. The revised HSRA model would destock voyages entirely or permit stocking densities that are too low to be economical, which effectively prohibits trade for 6 months. This is based on an assumption that stocking densities below 60% are uneconomical.

Appendix E: Benefits of improving animal welfare

Industry sustainability

If Australia is to maintain a sustainable live sheep export trade, supported by animal welfare outcomes, it is vital to establish trust and identify mutual benefits between the live export industry, the regulator and the Australian community.

Research and analysis undertaken for the department by the Futureye consultancy (2018) identifies that the Australian public is demanding better treatment of animals. Futureye also identified that improving animal welfare outcomes can mitigate the risk to the viability of the live export industry due to bad publicity, the potential loss of 'social license' and in extreme cases, complete market collapse. Futureye states that widespread media attention of poor animal welfare can draw large audiences into the debate, with reactive calls for extreme regulation. The Australian community has shown that they place a priority on good welfare outcomes and, as a stakeholder, the Australian community can exert influence. For example, in 2011 when video footage emerged showing animal cruelty in Indonesian abattoirs, there was public reaction and the Australian Government suspended all live cattle exports to Indonesia. In 2013, when video footage emerged showing cruelty to cattle exported live to Egypt, exports of all Australian livestock to Egypt were suspended.

The live export industry itself has demonstrated animal welfare initiatives that aim to promote the health and welfare of sheep. One example is the 2019 moratorium. In December 2018, ALEC announced an industry moratorium for June, July and August 2019, stating that 'June to August sheep exports to the Middle East are worth $55 million per annum, so the moratorium will, without any doubt, impact farm gate returns. But this decision shows the genuine care exporters have for livestock—values we share with producers—and our commitment to the industry's future'.

Another example of an animal welfare initiative is the development of the HSRA model HotStuff in 2003. Industry credits HotStuff with reducing live export mortalities due to heat. However, the introduction of reduced stocking densities based on allometric calculations, as required by the Middle East Order since July 2018, has rendered industry's HSRA model redundant in its existing form. Industry consultation has identified that there is a continued commitment to revising the HSRA model based on a new paradigm, focused on animal welfare rather than mortality.

The Sheep Collective is a collaboration of exporters, importers, industry bodies and producers that aim to 'provide clarity about the live sheep trade on behalf of our WA farmers, truck drivers, vets and industry representatives'. Via their website, *The Sheep Collective* showcases industry best practice throughout the supply chain and highlights that 'good welfare is at the core of *The Sheep Collective* because it's the right thing to do and it's also good business' (The Sheep Collective, 2020).

The examples outlined previously demonstrate that improved animal welfare outcomes are important, not only for the benefit of transported animals, but also to promote public approval and ongoing acceptance of the industry, its standards and practices.

Strategic business benefits

There are difficulties in measuring animal welfare gains quantitatively. McInerney (2016) suggested that the key question is not 'what does welfare improvement cost' but 'what is animal welfare worth?' This point, which was supported by the RSPCA Australia in their submission to the draft RIS, is relevant for the live sheep export industry. Industry must assess if animal welfare benefits sufficiently exceed economic costs and if they are critical to the survival of the industry.

Some studies highlight the conflict between animal welfare and efficient farming, stating that improving animal welfare, particularly in farm animal production, comes with an inevitable economic cost (McInerney 2016). Other studies argue that it is possible to reduce or avoid the conflict between animal welfare and efficient farming by reinforcing the financial and human benefits that can be derived from giving priority to animal welfare (Dawkins 2017).

Improving animal welfare may have financial benefits. The most obvious example of this is through the reduction in mortality. The 2017 August *Awassi* voyage recorded 2400 deaths from heat stress, a mortality rate of 3.76%, nearly a 4% reduction in value of the consignment as a direct result of mortalities. Exporters could derive a financial benefit by planning shipments in cooler months of year where mortality rates are typically lower. If onboard conditions promoted good animal welfare, there may also be reduced morbidity, resulting in sheep arriving at the destination port in improved body condition. Not only does this promote the exporter as a provider of quality livestock, healthy animals cost less in medications and effort needed to treat them.

Some studies show that consumers are willing to pay more (but not much more) to purchase ethically-produced meat from high welfare systems (Bennett et al. 2012, Vanhonacker & Verbeke 2014). Evidence of welfare-based marketing claims on animal products can be seen in Australian and international retail outlets: organic food, free-range pork, grain-fed beef, RSPCA-approved chicken and barn-laid eggs.

Improving animal welfare may also offer exporters and producers a commercial advantage to market their products as being from high welfare systems. Sheep Producers Australia (SPA) recognise the positive marketing opportunities of improving the health and welfare of animals. Goals in their Sheep Industry Strategic Plan (SISP), include 'developing measurable improvements in sheep welfare across the supply chain, which can build community support and increase productivity outcomes'. They identify that ethically-producing lamb and mutton underpins access to domestic and international markets (Sheep Producers Australia 2019).

Corporate social responsibility is an increasingly important policy of many companies from multi-nationals to community entities and at all stages of the supply chain. Companies are increasingly demonstrating a preference to participate in initiatives that benefit society, such as promoting animal welfare. These activities may enhance the reputation of involved companies and become an important part of their marketing strategy (Dawkins 2017).

In November 2019, one of Australia's biggest agricultural lenders, National Australia Bank (NAB), issued a statement that they will 'no longer provide finance to businesses non-compliant with animal welfare rules'. NAB said its principles were based on 'generally accepted, contemporary, scientific understanding of animal welfare' and were in line with international conventions, Australian Government and state and territory government regulations.

McDonald's (2020) indicates on its website that the welfare and humane treatment of animals is an important part of their selection process for suppliers. They specifically name Australia as a country with a live animal transport program. McDonald's have a policy that no beef may come from cattle that were shipped for more than 24 hours by sea and sent directly for slaughter. Suppliers of animal products are audited to comply with welfare expectations.

Animal welfare benefits

Greater space allowance for exported sheep has a number of welfare benefits:

- Fewer sheep on a deck results in a reduced total metabolic heat load, and therefore contributes less to increasing temperatures on a deck. This is particularly important for voyages during hot periods (MLA 2001).
- Greater space also provides for better air flow and improved dispersal of metabolic heat through radiation, conduction, convection and evaporation (Barnes et al. 2019).
- Fewer sheep per deck area is associated with lower levels of urine and faeces excretion that, in turn, is correlated with lower relative humidity and drier pad conditions resulting in lower levels of ammonia. The Middle East Order requires additional bedding, which helps keep the manure pad sufficiently dry, resulting in less moisture, less humidity and improved air quality (McCarthy & Banhazi 2016).
- More space also permits better access to food and water for all animals in a pen, as well as space for a large proportion of animals in each pen to simultaneously lie and rest (Petherick and Phillips 2009).

Caulfield and colleagues (2014) state that heat stress can compound health problems for sheep already weakened by other conditions such as salmonellosis and inanition. Common causes of sheep morbidity and mortality such as inanition (reduced feed intake) and disease (specifically salmonellosis and enteritis) have been reported at much lower rates than encountered on voyages prior to the Middle East Order being implemented.

Human and community benefits

There is a growing awareness of the close links between animal welfare and human health and wellbeing, as described by the One Health and One Welfare concepts. One Health is 'the collaborative efforts of multiple disciplines working locally, nationally, and globally, to attain optimal health for people, animals and our environment'. This definition was developed by the One Health Initiative Task Force, established in 2006 in response to global concern surrounding outbreaks of the H5N1 bird-adapted flu virus. One Welfare, similar to One Health, looks at issues surrounding animal welfare, human welfare and societal mental health, from a similar national and global perspective (One Welfare 2019).

Examples of One Welfare issues include:

- risks to human health of operating in environments that are poor for animal welfare such as exposure to pathogens and zoonoses
- risks to human health from the non-therapeutic use of antibiotics in farm animal production and emerging antibiotic resistance
- reduced injury and sickness in humans who work with animals from high welfare systems.

Futureye (2018) identifies the potential for improved psychological wellbeing of the Australian community due to the increased confidence that our animals are being treated humanely, which may then result in increased levels of support for the ongoing existence of the live export trade and increased trust in the industry.

Increased trust in the industry and the regulator

Better animal welfare outcomes, achieved through improved regulation, could build community trust and confidence in the department as the regulator and thereby improve community support for the live export industry. Industry groups have identified that it is important for them to have certainty around the operational structure of their industry to enable efficient planning, to encourage investment and to sustain research and development.

Appendix F: Middle East climate risk analysis for live sheep voyages

Science and evidence

The department considered the best available science and evidence including:

- analysis undertaken by the Bureau (2019) of historic temperatures and regional climatological analysis
- the HSRA Review and academic research that informed this review
- science and data provided in submissions to the HSRA draft report
- industry research
- IO reports
- voyage reports
- onboard observations during May 2019 voyages.

Heat stress thresholds and acclimatisation

Based on the parameters in the industry HSRA model (HotStuff), the heat stress threshold (HST) for a 40kg merino adult, acclimatised to May in southern Australia is 30°C WBT. Larger, heavier sheep will be less heat tolerant than this. The HST is the heat tolerance level for sheep on a deck and, according to the panel, represents the animal welfare threshold that should not be breached on live export vessels.

A submission to the *Draft Report by the Independent Heat Stress Risk Assessment Technical Reference Panel* stated that, based on measures taken during live export voyages, in winter-acclimatised sheep, there is an escalation of physiological heat loss mechanisms when the daily mean deck temperature reaches 30°C WBT. These comments did not reference a class of sheep.

Industry research that is embedded in HotStuff, observations by IOs and anecdotal reporting describes that certain classes and breeds of sheep are more heat tolerant than others. This variability was also acknowledged by the panel. For example, for sheep acclimatised to May conditions, a 40kg merino adult's HST is 30°C WBT, a 56kg merino adult's HST is 29.3°C WBT and a 90kg merino ram's HST is 28.2°C WBT.

The HotStuff model also defines mortality thresholds (the WBTs when sheep die). For a 40kg merino adult acclimatised to an Australian winter, the HotStuff model indicates the most susceptible sheep will begin to die at approximately 33.5°C WBT while this model indicates that around 50% of sheep will have died by 35.2°C WBT.

The LiveCorp & Meat and Livestock Australia (MLA) Veterinary Handbook for Cattle, Sheep and Goats (2020) also defines important heat stress levels. It notes that WBTs above 29°C are considered the 'danger' zone for sheep. In their feedback to the draft RIS, LiveCorp questioned the use of open mouth panting as a criteria for heat stress, and queried 'how long is prolonged

and how many sheep should be involved before it is considered unacceptable' and that 'some sheep can open mouth pant when body temperatures are normal'.

Sheep loaded during winter will be acclimatised to cool temperatures and therefore will have a lower tolerance for heat than sheep prepared for export in warmer months. The panel noted that an animal's heat tolerance changes over the course of the year depending on seasonal temperature exposure. The panel also noted that it is not known how long sheep take to acclimatise but that other species have demonstrated some acclimatisation over 2 to 3 weeks.

The McCarthy Review noted that acclimatisation plays a significant role in adjustments to sheep metabolism. This review report states that there is a lag in the way sheep adjust their metabolic rate in response to local weather, with winter-acclimatised sheep the least able to adapt to hotter temperatures, increasing the risk of inanition and salmonellosis.

There is limited science and research on heat stress in sheep during live exports. The HSRA Review highlighted gaps in existing research in areas such as diurnal and day-to-day variation in deck temperatures, respite from heat, duration of exposure and appropriate settings for lambs. There is also a lack of consensus on the validity of the research that has been conducted. Some submissions to the draft HSRA Review noted limitations in the science that was used to justify the recommendations made around heat stress thresholds.

Climatology

The Bureau analysed WBT statistics for each day of the year from April through to November for the period 1990 to 2018 (BoM 2019).

Deck WBTs on board live sheep export vessels are higher than ambient temperatures typically by 1°C to 3°C due to the metabolic heat created by the animals. The rise in WBT on the decks depends on the pen space, class of sheep and the rate and effectiveness of ventilation on the vessel. This means when the ambient temperature is 29°C WBT, deck temperatures experienced by the livestock will be around 30°C to 32°C WBT.

According to data analysed by the Bureau, for the main routes into the Persian Gulf (Straits of Hormuz), and the Red Sea (Bab al Mandab Strait), 95th percentile maximum WBTs exceed 29°C WBT from late May and fall below 29°C WBT in early October (BoM 2019; Figures 3–9, page 21 and Figure 3–21, page 29). Most WBTs for the duration of September in the Persian Gulf and the Red Sea remain as high as, or higher than, average WBTs in June. These findings are consistent with industry research (Stacey 2017).

The 95th percentile maximum WBTs in the Persian Gulf exceed 29°C WBT around mid June and fall below 29°C WBT in the last week of September (BoM 2019; Figure 3–16, page 25). However there are destination specifics to note:

- The offshore area and international airport of Doha, Qatar reach 29°C WBT maximum earlier, at the start of June. WBTs at these locations fall below 29°C WBT at the end of September and first week of October respectively (BoM 2019; Figure 3–12, page 23).
- The 95th percentile WBTs in Muscat, Oman exceed 29°C WBT maximum from the middle of May and remain hot until the end of September (BoM 2019; Figure 3–7, page 20).

Based on this analysis, the department determined that if 95th percentile ambient temperatures were at 29ºC WBT or above (which leads to deck temperatures of 30–32ºC WBT), there was an elevated risk of heat stress and adverse animal welfare outcomes.

Risk analysis based on mortality data 2013 to 2017

The department undertook an analysis of relative monthly mortality data from voyages to and through the Middle East from 2013 to 2017. Data from 2018 and 2019 were analysed separately to keep the trend analysis consistent with underlying regulatory conditions such as pen space allowances. Noting that different stocking densities are now in use, this was not considered indicative of likely mortalities in 2019, but rather considered indicative of relative risk of poor animal welfare outcomes in different months.

Average historical monthly mortality levels for Middle East voyages from 2013 to 2017, prior to regulatory changes in 2018, demonstrate:

- a 5-year average mortality rate of 0.71%
- the months of June to September (inclusive) have higher averages than the 5-year average.

This analysis suggests the riskiest months based on historical mortality are June to September (inclusive).

There was a significant reduction in the mortality rate per voyage from the 5-year average January 2013 to December 2017 (0.72%) to the average over the period 1 July 2018 to 31 October 2019 (0.3%). This improvement reflects the introduction in 2018 of increased pen space allowances, the prohibition in 2019 and other measures. This was also influenced by very few Middle East voyages from June to November 2018 and the prohibition in 2019.

The benefits of using the allometric space allowances have been demonstrated in the outcomes of voyages conducted since the implementation of the Middle East Order, noting this has been in conjunction with prohibitions for 3.5 months over the hottest part of the Middle Eastern summer for 2018 and 2019. Voyages in the shoulder periods of the summer prohibitions in 2018 and 2019 have produced record low mortality rates and by implication, better welfare outcomes.

Data and voyage reports from May 2019 sheep export voyages to the Middle East

In his review of heat stress, Dr McCarthy recommended that a revised model to assess heat stress should adopt the view that subjecting sheep to open mouth panting is unacceptable. This was supported by the panel's explanation that when an animal is panting with its mouth open, it is having 'to work much harder to try and lose heat from the body, and this is considered to be beyond what is acceptable [welfare]'.

The panel and others noted that in the absence of taking an animal's body temperature, panting is the best available behavioural observation to indicate heat load.

The panel acknowledged there is a duration component to heat stress. Based on the limited research on duration of exposure, it is arguable whether short periods of open mouth panting constitute compromised welfare.

The AVA has suggested that 'sheep should not be exposed [to conditions whereby their daily mean core body temperature has significantly increased 0.5°C above pre-heat values] for more than 3 consecutive days where there is no diurnal variation in temperature. Diurnal variation allows sheep to return to their thermoneutral zone and for respiratory rates to return to resting range at night. Otherwise, sheep can start dying within 3 days of being exposed to hot, humid weather, as heat load is cumulative. This duration of permissible exposure should be further reduced in the presence of other welfare imposts and/or co-morbidities as these will further reduce the animal's ability to cope.'

Interim analysis of May voyages with regards to sheep heat stress:

- Reports from the IOs and AAVs on board the 3 vessels varied widely in their recording of panting scores and their assessment of heat stress. Above 31.0°C WBT video footage from the May 2019 voyages show all sheep with increased respiratory effort including periods of panting with open mouths.
- Environmental data recorded on each deck for the 3 vessels indicates that high WBTs (30°C to 33°C WBT) were reached for relatively short periods at a time (1 to 6 hours) before temperatures dropped (often quite quickly). While there is little data about a sheep's ability to withstand extended periods of hot conditions, the available science indicates that extended hot conditions may contribute to adverse animal welfare outcomes.

Interim analysis of May voyages with regards to sheep mortalities:

- There were no reported mortalities related to high temperatures recorded on any of the voyages.
- Mortality rates were at record lows, and 64% lower compared with the previous 5 years.
- The small sample size of 3 voyages is not large enough to have strong statistical significance. However, the fact that their average mortality rate per voyage was much lower than the longer term average, implies that the conditions under the Northern Summer Order contributed to improved animal welfare outcomes.

Conclusion

Using a risk-based analysis of the best available science and evidence, the department determined that voyages to, or through, the Middle East should be avoided if the risk of heat stress (ambient WBTs exceeding 29°C WBT) was 5% or more. Based on climatological analysis, the department has determined that if 95th percentile ambient temperatures are at 29°C WBT or above (which leads to deck temperatures of 30–32°C WBT), there is an elevated risk of heat stress and adverse animal welfare outcomes. Industry research supports this view. The LiveCorp and MLA Veterinary Handbook for Cattle, Sheep and Goats (2020) defines important heat stress levels, noting that WBTs above 29°C are considered the 'danger' zone for sheep.

The prohibition periods have been based on data from the Bureau for 95th percentile ambient temperatures. Using 95th percentile ambient temperatures prevents exports when there is a 5% or greater likelihood that temperatures experienced on voyages to, through or at destinations in the Middle East, could cause heat stress in sheep.

Appendix G: Independent reviews

The airing of the *Awassi* incident footage in 2018 prompted 3 independent review processes.

Review of the Regulatory Capability and Culture of the Department of Agriculture (Moss Review)

This review examined the regulatory capability and culture of the department as the regulator of live animal exports, and made recommendations aiming to ensure adherence to animal welfare standards, compliance with the regulatory framework and to enhance the regulatory model. The review made 31 recommendations that were supported, or supported in principle, by the department. Of note were that:

- the ASEL are reviewed on a regular basis to reflect industry, scientific and regulatory developments and community expectations concerning live animal exports
- the department re-establish an Animal Welfare Branch and place animal welfare at the centre of its live animal export regulatory activities
- an independent external entity, the Inspector-General of Live Animal Exports, oversee the department in its role as the regulator of live animal export
- the position of Principal Regulatory Officer be established to enable staff engaged in the regulation of live animal exports to develop a culture of being professional regulators.

Independent Review of Conditions for the Export of Sheep to the Middle East during the Northern Hemisphere Summer (McCarthy Review)

This review was commissioned to advise on conditions and any changes to the administration of the ASEL and/or actions that would be required to assure health and welfare outcomes for sheep being transported to the Middle East during the Northern Hemisphere summer. The review made 23 recommendations that were supported by the department. Of note were that:

- industry focuses on measures that reflect animal welfare over mortality alone, and that the risk assessment model replaces the mortality limit with a heat tolerance level
- the risk settings of the HSRA are adjusted to better reflect community expectations
- space allocation should be based on allometric principles and adopt a k-value of 0.033, and this be utilised from May to October (unless overridden by the HSRA model's assessment)
- a vessel's PAT be independently verified for sheep exports to the Middle East during the Northern Hemisphere summer
- the reportable level for sheep travelling from Australia to the Middle East be reduced from 2% to 1% effective immediately.

Heat Stress Risk Assessment Review (HSRA Review)

The department sought advice from an independent Technical Reference Panel (panel) on moving from a HSRA based on mortality, to one based on welfare and the animal's physiological signs of excessive heat load. The panel reviewed available science and evidence regarding heat

stress in sheep and recommended development of a new HSRA framework. This included the use of a WBT welfare threshold as the criterion to limit the risk that exported sheep are exposed to excessive heat load. The panel also identified the need for future refinements of the HSRA model to examine diurnal and day-to-day variations in deck WBT data to determine the influence of duration of exposure and further work to define appropriate heat stress thresholds for lambs.

Appendix H: Comparison of space allocations under HotStuff (version 4) and allometric requirements

To demonstrate pen space allowances provided by the HSRA model over the ASEL, and allometric space over the HSRA model, the department analysed a range of 2016 to 2017 voyages (Table H1). This analysis showed allometric pen space allowances are almost always greater than that provided by the existing HSRA model.

Table H1 Pen space allowance comparison of the HSRA, the ASEL and allometric space

Departure month	Year	Vessel average PAT quality	HSRA space over the ASEL [a]	Allometric space over HSRA [b]	Destination
May	2016	100–150	0%	+32%	Persian Gulf
	2017	150–200	0%	+36%	Persian Gulf
		<100	–4%	+26%	Persian Gulf
June	2016	>200 [c]	0%	+30%	Red Sea
		<100	–3%	+27%	Persian Gulf
	2017	150–200	0%	+32%	Persian Gulf
		100–150 [c]	–1%	+31%	Red Sea
July	2016	100–150	–4%	+27%	Red Sea
		<100	–24%	+1%	Persian Gulf
	2017	100–150	0%	+33%	Persian Gulf
		<100	–22%	+2%	Persian Gulf
August	2016	150–200	0%	+33%	Persian Gulf
		100–150	–1%	+24%	Persian Gulf
		<100	–32%	–10%	Persian Gulf
	2017	>200	–9%	+26%	Gulf of Oman
		150–200	–9%	+25%	Red Sea
		<100	–32%	–6%	Persian Gulf
September	2016	150–200	0%	+31%	Red Sea
		100–150	0%	+33%	Persian Gulf
	2017	150–200	0%	+32%	Persian Gulf
		<100	–1%	+31%	Persian Gulf
October	2016	100–150	0%	+34%	Persian Gulf
		<100	0%	+30%	Persian Gulf

Departure month	Year	Vessel average PAT quality	HSRA space over the ASEL [a]	Allometric space over HSRA [b]	Destination
	2017	>200 [c]	0%	+26%	Persian Gulf
		100–150	0%	+34%	Red Sea

a This percentage displays the space allowance that the HSRA has allocated, compared with the baseline ASEL requirements. A negative percentage means that HSRA would require more space than the ASEL. **b** This percentage displays the allometric space allowance compared with the space allocated by the HSRA. A positive percentage means that the allometric formula would have provided more space than the HSRA, while a negative percentage means that the HSRA model would have given more space than the allometric formula. **c** Unaudited PAT scores.

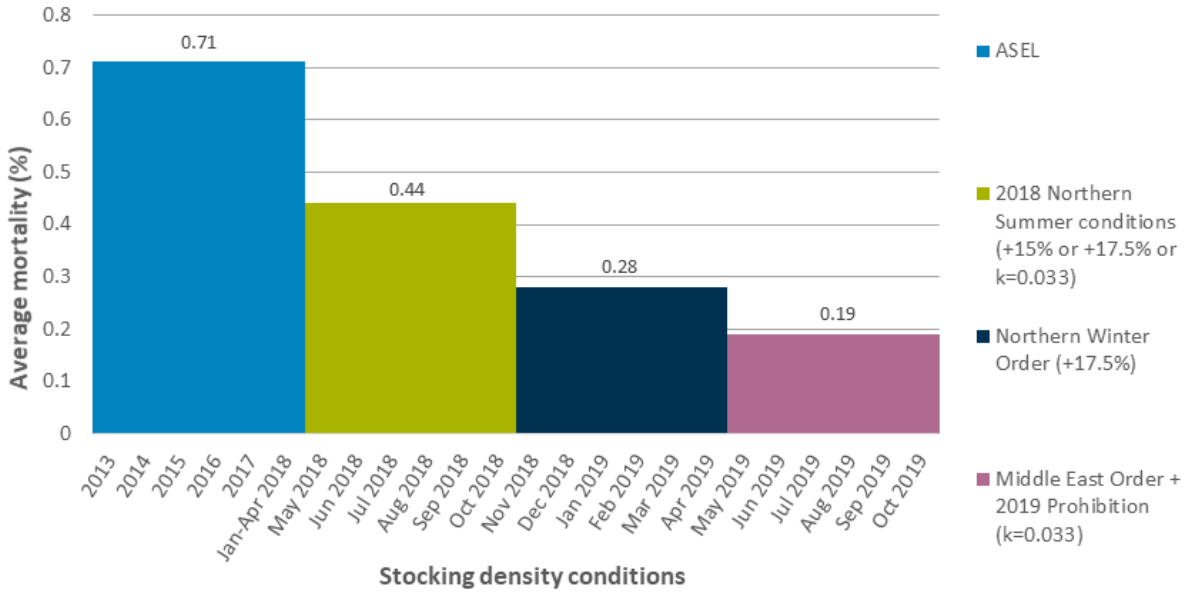
Pen space allowances and voyage mortality data

The department has reviewed pen space allowances and voyage mortality data for 2013 to 2019.

Figure H1 shows the incremental decline in average mortalities recorded on voyages during consecutive 6-month periods under the different regulatory frameworks that have been implemented since the McCarthy report was released in April 2018. The graph is divided into periods:

- January 2013 to April 2018—stocking densities determined by the ASEL (version 2.3) and the existing HSRA model.
- May 2018 to October 2018—no voyages in July and August (for commercial reasons). Various temporary stocking densities provided up to 17.5% additional space compared with the ASEL (version 2.3) and then allometric stocking densities applied (under the Middle East Order from July onwards). IOs provided additional oversight during this period. This period most closely approximates the impact of the status quo (option 1), noting however that there were no voyages in July and August.
- November 2018 to April 2019—stocking densities 17.5% above the ASEL (version 2.3) under the Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East – Northern Winter) Order 2018 with IO oversight.
- May 2019 to October 2019—prohibition from 1 June to 22 September. Allometric stocking densities under the Middle East Order and prohibition from 1 June to 22 September with IO oversight.

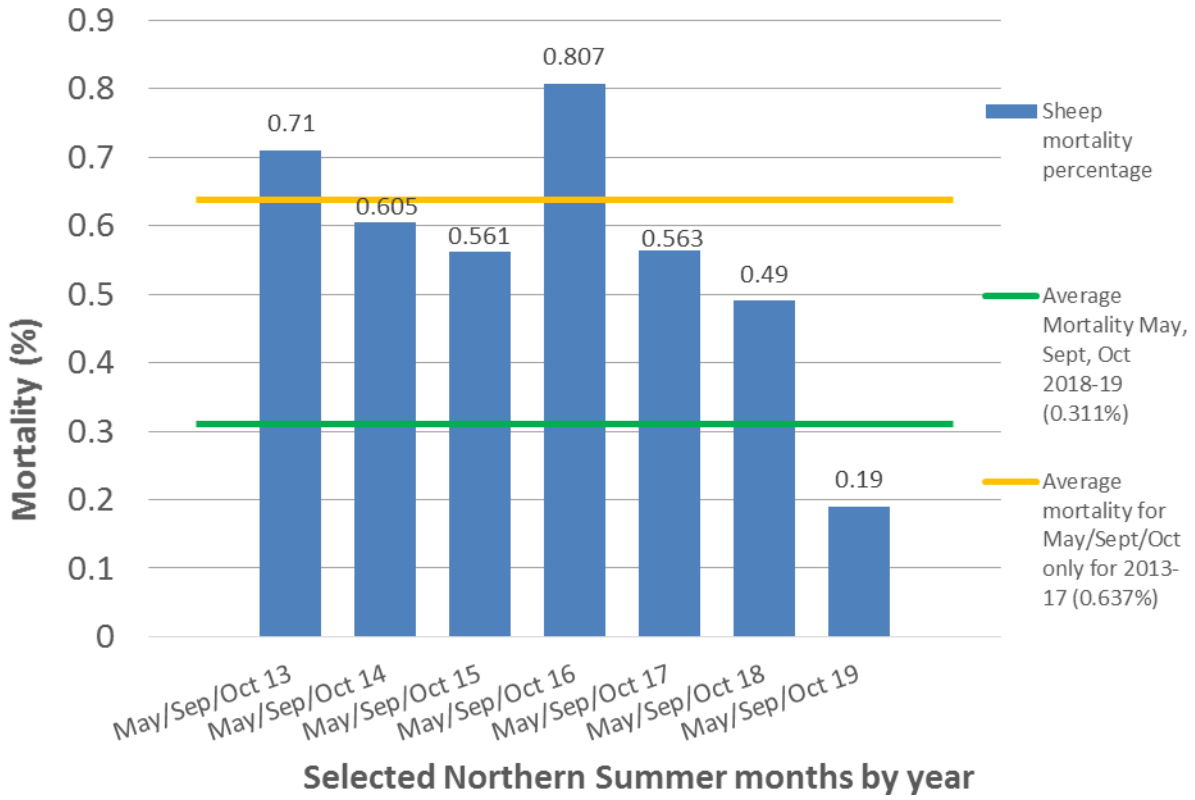
Figure H1 Average sheep mortality compared with stocking density, 2013 to present



The shipping standstill during much of the 2018 Northern Hemisphere summer and the regulated prohibition during the 2019 Northern Hemisphere summer, limited the number of voyages during June, July and August. This, and the Middle East Order, means direct comparison of voyage outcomes in 2018 and 2019 against earlier years is not a like-for-like comparison.

Therefore, to assist in making approximated comparisons between years, the department analysed mortality data for the period 2013 to 2019 with June, July and August figures excluded from the analysis. Figure H2 compares data collected during May, September and October from 2013 to 2019. It shows a reduction in average mortality rates (green line) for voyages during the months of May, September and October 2018 to 2019 (average 0.311%), compared with average mortality rates (yellow line) for voyages during the same months over the previous 5-year period from 2013 to 2018 (average 0.637%). While these are averages, and are therefore representative of a range of outcomes, these comparisons demonstrate the animal welfare value of the Middle East Order in the shoulder periods of the Northern Hemisphere summer.

Figure H2 Sheep mortality for Northern Hemisphere summer 2013 to 2019: May/Sep/Oct



Appendix I: Economic considerations of reducing the live export trade

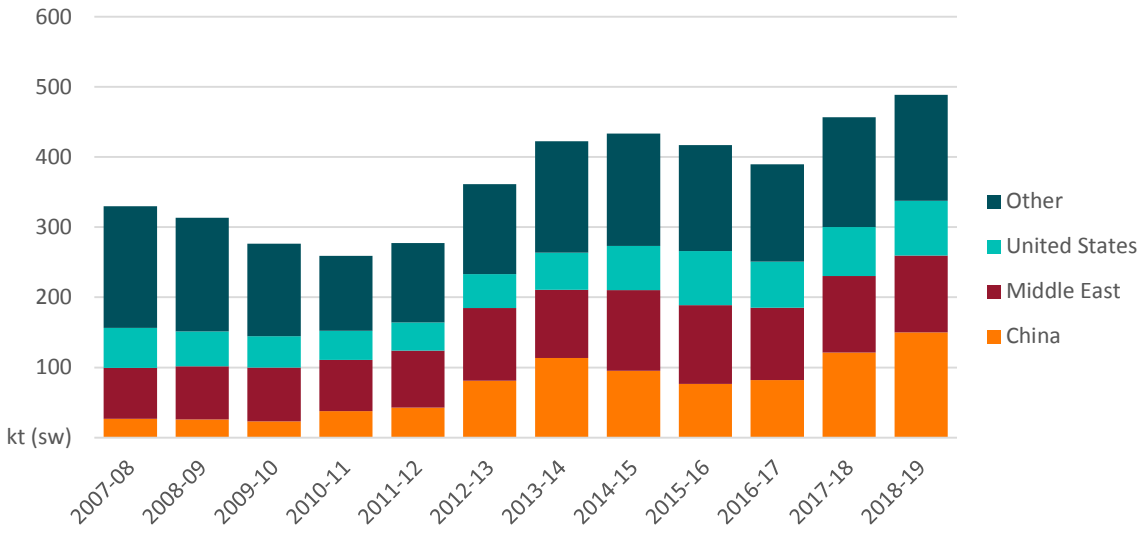
Australia's sheep meat prices are set in world markets. Australia contributed to just over one third of world exports in sheep meat from 2012 to 2016 (UN Comtrade 2019). This large share of world trade means that world prices are likely to fall if supply increases. The potential increase in supply, however, is estimated to be small, with the department's analysis showing that if 50% of the sheep exported live in 2017 were slaughtered in Australia and exported as meat, world supply of sheep meat would increase by only 1.5%.

Restricting live exports is expected to have 2 distinct market impacts:

1) A decline in world sheep meat prices due to an increase in sheep meat supply out of Australia.
2) A decline in domestic saleyard/direct sale prices due to an initial increase in the supply of sheep for slaughter into the domestic processing market until the market adjusts.

According to ABARES (2020), the economic impact of restrictions on live sheep exports has been more than offset by strong global demand for Australian sheep meat. Australia's lamb exports surged in 2018 and 2019 mainly due to strong demand in China as a result of rising incomes, changes in consumer preferences and substitution away from pig meat as a result of African swine fever (Figure I1). This increase in demand has more than offset any downward pressure in world lamb prices that may have resulted from a small increase in Australia's supply of sheep meat to world markets.

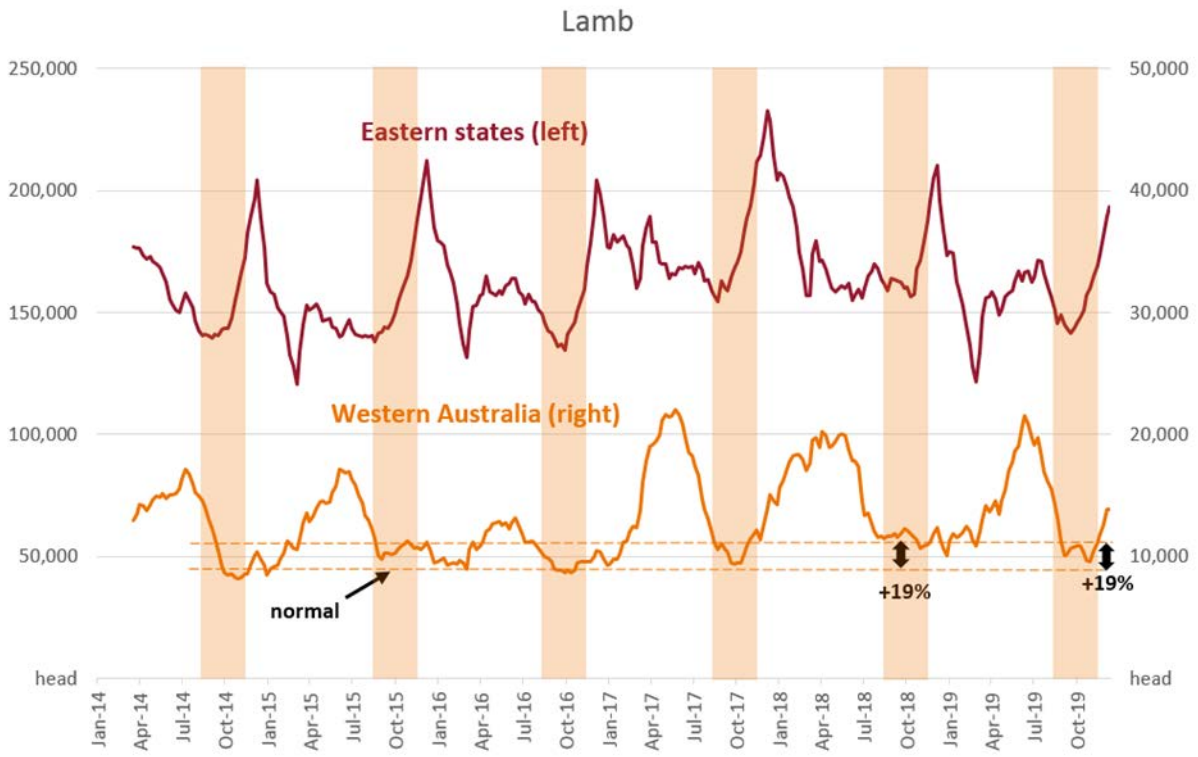
Figure I1 Australian sheep meat exports, 2007–08 to 2018–19



Note: ABS defines Middle East to include: Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syria, United Arab Emirates and Yemen.
kt kilotonne. **sw** slaughter weight.
Source: ABS

Diverting sheep from live exports to domestic processing is expected to depress saleyard prices in Western Australia. This was demonstrated in 2018 and 2019, when the number of sheep and lambs delivered to WA saleyards (known as yardings) increased after reductions in the trading periods for live sheep exports (Figure I2). Increases were most significant in in late winter and early spring, the months when slaughter is usually lowest. During the spring months, from 2013 to 2017, lamb yardings averaged just under 9,500 per week in Western Australia. In 2018 and 2019 the number of lambs delivered to saleyards increased by 19% on average in the same months.

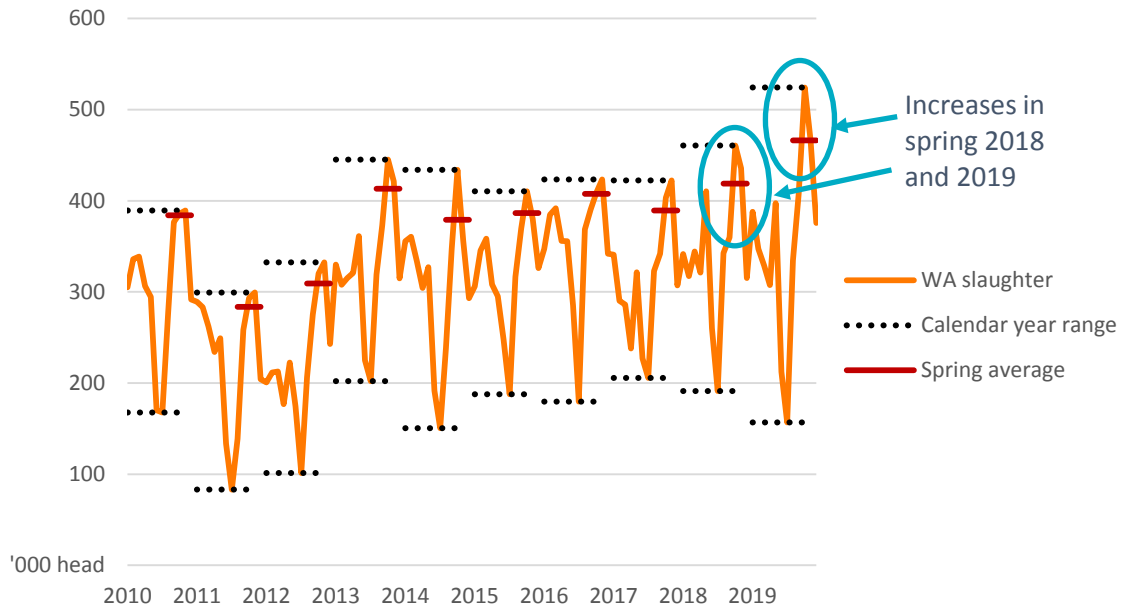
Figure I2 Number of lambs sold through saleyards (12-week moving average), 2014 to 2019



Source: ABARES analysis of data from Meat and Livestock Australia

In 2018, WA lamb and sheep slaughter increased slightly after the introduction of new regulations for sheep export, although these increases are small relative to the seasonal variability in slaughter rates (Figure I3).

Figure I3 WA lamb and sheep slaughter, January 2010 to December 2019



Source: ABARES analysis of data from the Australian Bureau of Statistics (ABS) Livestock and Meat, Australia, cat. no. 7218.0, Canberra

In 2019, total sheep slaughter in Western Australia was within 0.5% of the average for 2013 to 2017 for May through to August. Lamb slaughter was 8% lower than the 2013 to 2017 average for these months due mainly to restocking intentions earlier in the season. For the peak processing months between September and November 2019, slaughter was 18% higher than the average between 2013 and 2017. Lamb slaughter was 7% higher than the average from 2013 to 2017 during October and November 2019.

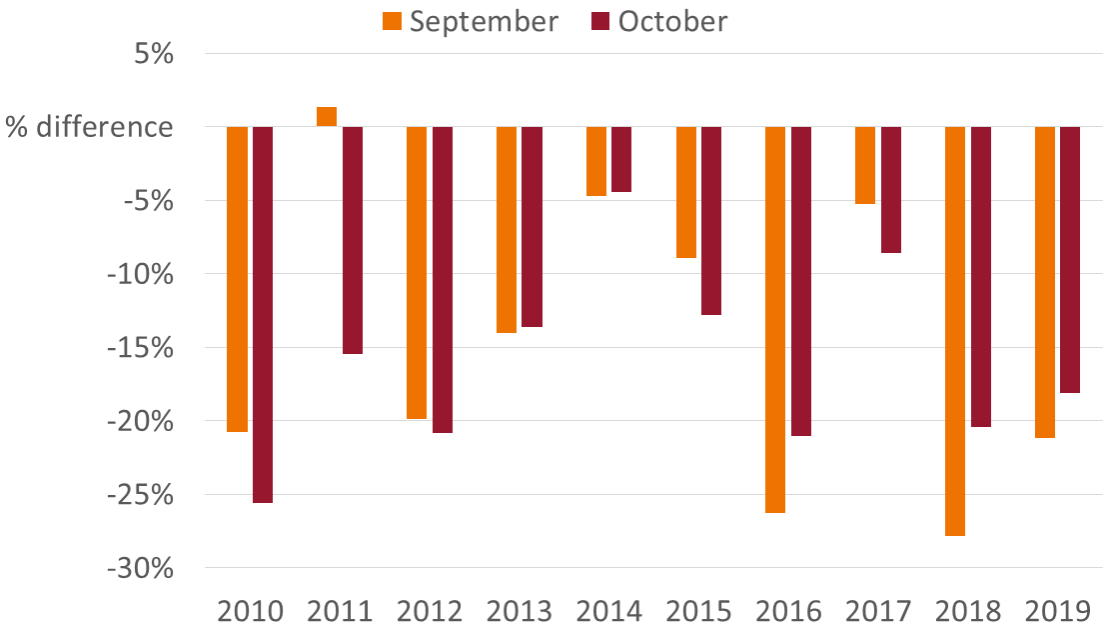
Monthly combined lamb and sheep slaughter in Western Australia between May and August 2018 was 12% higher than the average over the same months between 2013 and 2017. For the peak processing months between September and November 2018, slaughter was 6% higher than the average between 2013 and 2017. Lamb slaughter was 11% higher between May and August 2018, and 13% higher between September and November 2018.

Dalgleish and colleagues (2020) also state that the extension of the prohibition of live sheep to the Middle East in August 2019 saw prices for lambs and sheep in WA saleyards fall by 15 to 30%.

The impact of a cessation of live exports on price is most apparent when relative prices are reviewed between eastern and Western Australia. Saleyard lamb prices for Western Australia are usually lower than prices in Australia's eastern states. Over the 5 years from 2013 to 2017, WA trade lamb prices averaged 12% lower than eastern state prices in both September and October. In 2018, the discount for trade lamb prices in Western Australia widened to an average of 28% lower in September and 20% lower in October (Figure I4). In 2019, WA trade lamb prices were 21% and 18% lower in September and October when compared with the eastern states.

In 2018, the discount for trade lamb prices in Western Australia widened to an average of 28% lower in September and 20% lower in October (Figure I4). In 2019, WA trade lamb prices were 21% and 18% lower in September and October when compared with the eastern states.

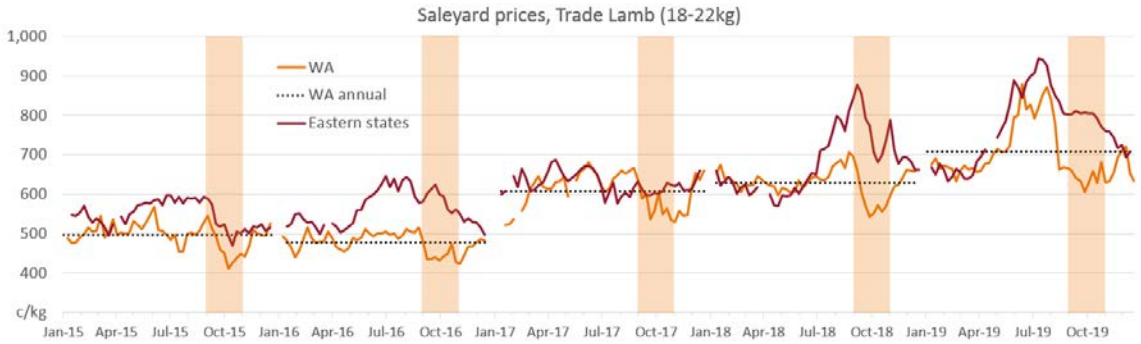
Figure I4 Average monthly price difference between trade lamb (18–22kg) prices in the eastern states and Western Australia



Note: A negative percentage difference here indicates that WA trade lamb prices were lower than in the eastern states.
Source: ABS

Despite the relative price impacts, in 2018 and 2019, absolute WA saleyard prices for trade lamb were historically high relative to prior years. As noted with world prices, this was due to strong global demand for sheep meat, particularly from China (Figure I5). So while the temporary cessation of live exports during the Northern Hemisphere summer depressed prices by 10–20%, this was only noticeable relative to prices in eastern states. The impact to the supply chain was buffered by current strong global demand.

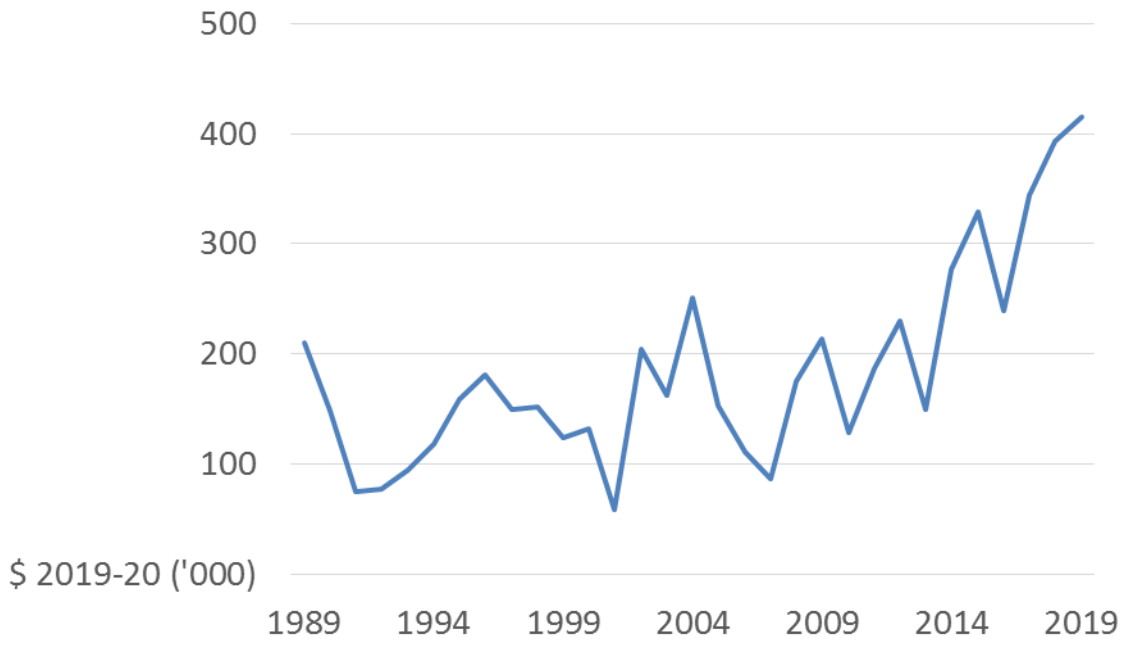
Figure I5 Weekly saleyard prices, trade lamb (18–22kg)



Source: Meat and Livestock Australia

However, strong export demand and high prices significantly increased the incomes of sheep farmers in Western Australia during 2018 and 2019 when live exports were restricted. Average farm cash incomes for the 4000 farms in Western Australia with more than 100 sheep increased by 14% in 2018 and by 5% in 2019, following a 44% increase in 2017 (Figure I6).

Figure I6 Farm cash incomes for farms in Western Australia with more than 100 sheep, 1989 to 2019



Source: ABARES

The most recent study by Dalgleish and colleagues (2020), commissioned by LiveCorp, estimated the cost of disrupting the live sheep trade to be $83.6 million in 2018 and $65.8 million in 2019. The value chain analysis in the report suggests these impacts are likely to be permanent. This estimate of industry impact was derived by estimating the value of foregone exports and subtracting the revenue foregone by selling these sheep at lower saleyard prices.

Analysis of the study by Dalgleish and colleagues (2020) found the impact of restricting live exports is likely to be overstated for 2 reasons. First, a 30–50% reduction in saleyard prices was assumed based on Centre for International Economics (2018), despite a footnote that saleyard price were observed to fall by only 15 to 30%. Second, there is no recognition of the likely short-term nature of these price impacts, or the likelihood that prices will rise as an expansion of domestic meat processing reduces processing costs.

An earlier report from Dalgleish and colleagues (2020) estimated that if sheep currently exported live were slaughtered in Western Australia, sheep and lamb prices in Western Australia could fall by between 18 and 35%. This was projected to reduce farmers' revenues by between $80 million and $150 million. They appear to have reached these results by assuming that sheep slaughter in Western Australia determines the state's export prices of mutton and lamb, rather than prices being determined in world markets.

In contrast to findings by Dalgleish and colleagues (2020), Davey and Fisher (Pegasus Economics report, 2020) states that 'the analysis conducted in … [the draft RIS] is supportive of the proposition that there is likely to be a relative decline in WA saleyard/direct sale prices compared with the eastern states in the event of the withdrawal of live sheep exporters from purchasing sheep'. Their modelling suggests any price decline will be 'between $4.68 and $7.37 per head.' Davey and Fisher (2020) estimate live sheep exporters pay 'a price premium of almost 18.7 cents per kg cwt, which roughly translates to $4 per head. At current export levels of around 1 million live sheep exported per annum, the cessation of the live sheep export trade would thus translate into a loss of around $4 million for WA sheep farmers from the loss of the price premium paid by live sheep exporters. This works out at around $936 per WA sheep farmer on average'.

The department considers both the Dalgleish and colleagues (2020) and Davey and Fisher (2020) stakeholder analyses have strengths and weaknesses but it is difficult to draw accurate conclusions when predicted industry impacts vary so widely.

Two industry studies based on the Global Meat Industry Model (GIM) developed by the Centre of International Economics (CIE) have looked at the economic impact of ceasing the live export trade, although this data is now somewhat outdated. A study conducted by Hassall and Associates (2006) for MLA and LiveCorp estimated that ceasing live exports would cause sheep prices to fall by around 17 cents per kilogram, and lamb prices by 7 cents per kg. In this study the estimated aggregate effect of a cessation would reduce the gross value of the Australian sheep meat industry by $219 million. A Centre for International Economics (2011) study for MLA estimated that the farm gate price of older sheep would fall by 14.6 cents per kg if live exports were ended, with the price of lambs falling by 12.2 cents per kg. The study estimated a reduction in the gross value of the sheep meat industry by around $119 million.

There was a 46% difference between the predicted impact on the value of the sheep meat industry predicted by Hassall and Associates (2006) and the Centre for International Economics (2011). The authors of the latter study attribute the lesser impact predicted by their study to improved modelling and more conservative assumptions about the number of livestock that would be transported for processing in eastern Australia. Structural changes reduced the importance of live exports to the sheep industry between the 2 studies.

Appendix J: Consultation

Issues raised in submissions to the draft RIS

The department identified key topics of debate that were regularly raised in submissions to the draft RIS and in face-to-face and teleconference meetings. These topics included, but are not limited to:

- additional conditions under option 2 in the draft RIS
- removal of requirement to use the existing HSRA
- duration of prohibition
- revision of the HSRA model
- alternative options
- the inclusion of a 'status quo' option of no prohibition
- diurnal variation
- ability to review policy
- loss of market and reputational effects
- capacity of domestic processing facilities
- WA flock numbers and survival of the WA sheep industry
- certainty for the industry
- limitations of a prohibition
- development of new technologies
- assumptions and unresolved issues.

Additional conditions under option 2 in the draft RIS

Additional prohibition periods for Qatar and Oman

Stakeholder feedback identified that the additional prohibition periods for Qatar and Oman in the draft RIS would negatively impact the viability of the live sheep trade, with a direct negative impact on producers. The department reviewed 95th percentile temperature data from the Bureau, taking into account the diurnal variation in ambient temperatures of between 3°C and 4°C WBT at destination ports in June. Based on this assessment, and stakeholder feedback, the department has amended the additional prohibition periods for Qatar and Oman. To avoid the risk of heat stress in exported sheep the department will implement additional prohibition periods for Qatar and Oman:

- Qatar prohibited from 22 May to 22 September
- Oman prohibited from 8 May to 14 September.

Industry groups voiced concern that the additional prohibition periods proposed in the draft RIS for Qatar and Oman would unnecessarily limit live sheep exports to those destinations. ALEC states ‘the live sheep export trade is already under severe commercial pressure and any

further restrictions to its operating capacity will continue to erode the sustainability of the industry'. The PGA states that Qatar accepts approximately one third of Australia's live sheep exports and that additional prohibition periods could 'drive importers to source sheep from other countries which could result in complete loss of the market.'

Single discharge port for voyages arriving in the Persian Gulf during June or departing Australia between 15 to 30 September

Based on stakeholder feedback, it was determined that a single port of discharge condition would have unintended negative diplomatic, trade and economic implications, with minimal evidence of improved welfare outcomes. To maintain a viable sheep export industry and ensure animal welfare, the department requires that voyages have no more than two (2) ports of discharge for voyages arriving in the Persian Gulf after 1 June and departing Australia between 15 and 30 September.

During consultation industry groups such as National Farmers' Federation (NFF) and LiveCorp have raised concerns that this condition further restricts shipments of Australian sheep and has political, diplomatic and commercial implications. ALEC claims these implications include:

- growing resentment amongst Persian Gulf trading partners caused by continual and repeated interference and doubt from the Australian Government and the impact it has on their businesses and increased risk to their sovereign food security
- the increased risk of Persian Gulf markets seeking to stockpile Australian sheep to mitigate additional regulatory barriers
- the increased need for road transport of sheep from Kuwait to other Persian Gulf states which has the potential to result in poorer animal welfare outcomes.

The department notes that there was no evidence that Australian sheep were stockpiled ahead of the prohibition in 2019 and that land transport from Kuwait to neighbouring countries would require transit through Saudi Arabia. This in turn would require an approved ESCAS contingency arrangement in Saudi Arabia and approval from the Saudi Arabian and receiving state governments.

Another industry concern is that this condition would unfairly isolate and impact smaller markets such as the UAE and Oman. Voyages leaving Australia in May, or voyages arriving in October to these destinations, would become unviable, effectively extending the prohibition for these markets to almost 6 months. Additionally, ALEC remarks that 'many of our trading partners in the Persian/Arabian Gulf are smaller markets than Kuwait and are unable to receive full shipments of Australian sheep. Whilst currently small, the Omani and UAE markets, for example, have significant growth potential and are extremely important markets for Australia. The only way these markets can be accessed and remain viable is through shipments that disembark at multiple ports'. The department notes that this assumes use of the large vessels currently used for this trade and that the fleet approved for livestock exports from Australia includes many smaller vessels.

The NFF asserts this requirement 'could compromise trade opportunities and that there is no compelling evidence that removing the ability to discharge stock at multiple ports would achieve improved welfare outcomes'.

Industry groups cite Export Advisory Notice (EAN) 2018-06 that mandates if Kuwait is one of the destinations during the Northern Hemisphere summer, the vessel must discharge sheep in Kuwait first. Substantial destocking occurs in Kuwait, increasing space allowances for sheep in preparation for proceeding ports. LiveCorp states this has proved highly successful in achieving good animal welfare outcomes.

Sheep should be exported with the shortest wool length possible and this must not be greater than 25mm for each individual animal

Based on stakeholder feedback, it was decided a 15mm wool length limit would have greater negative welfare outcomes than benefits. Therefore, it was determined by the department that sheep should be exported with the shortest wool length possible and this must be not greater than 25mm for each individual animal. This will provide exporters with an expanded window to shear their sheep and for any shearing cuts to heal. This change is intended to:

- ensure that sheep still have a wool length short enough to assist with tolerating hot conditions
- reduce the likelihood of sheep with unhealed shearing wounds being loaded on export vessels by providing a shearing condition that supports shearing times further from the time of export
- reduce handling stress on sheep in the pre-export period.

There is general consensus from industry that 'short wool sheep travel better on vessels' (ALEC submission to the draft RIS), however feedback from industry identified the impracticalities around the wool length requirement of 15mm or less, and the concern that this requirement could actually result in poorer animal welfare outcomes from repeated handling. Some sheep may face the prospect of requiring shearing again within a short period of time, increasing the risk of exposing sheep to shearing nicks and cuts and resulting in repeated handling, increased stress and potentially negatively impacting animal welfare.

LiveCorp stated in its submission to the draft RIS that typically shearing occurs in registered premises at a rate of around 2500 sheep per day. For a shipment where 50,000 sheep need to be shorn, this is equivalent to 20 days' work. To stipulate a wool length of 15mm, the time in registered premises would need to be significantly extended to enable such a large number of sheep to be shorn, resulting in additional agistment and feeding costs. LiveCorp also questions the practicality of this condition as the ASEL mandate that sheep shorn in a registered premises must be accommodated in sheds, as there are estimated to be only 2 sheep registered premises with shedding facilities that could manage this requirement.

Body condition score of exported sheep must be 2 or more and less than 4, on a scale of 1 to 5

Based on stakeholder feedback, the department determined that a half body condition score would be difficult to assess. To promote selection of more heat tolerant sheep the department requires that body condition score of exported sheep must be from condition score 2 to less than 4, on a scale of 1 to 5.

According to ALEC, most exported sheep will be in body condition scores of 2 or 3. However, ALEC states that reducing the body condition score of sheep able to be exported to the Middle East unnecessarily further restricts the numbers of sheep an exporter has access to in a purchasing program.

Industry research recognises that body score can impact on a sheep's heat tolerance. A 2005 report by MLA noted that 'fatter animals have a number of extra risk factors and have more difficulty adjusting to extreme heat. This is especially an issue for sheep and cattle travelling from southern Australia in winter to a much hotter Northern Hemisphere summer such as the Middle East'.

Removal of requirement to use the existing HSRA

Consultation showed support for this condition from welfare and industry groups.

The AVA is supportive of the condition to remove the requirement to use the existing HSRA model based on mortality, however does not support a complete removal of the need to undertake a HSRA.

ALEC stated it 'does not support the use of the existing HSRA model and agrees with the department that in its current form, the existing HSRA model serves no purpose and is an unnecessary regulatory burden'.

Duration of prohibition

The majority of submissions (76%) supported some form of prohibition, with support coming from industry groups as well as animal welfare groups. Generally, welfare groups were in favour of longer prohibition periods, while industry groups were supportive of the 3.5-month prohibition proposed in option 2, with some disagreement with the extended prohibition periods for some ports and additional conditions under this option.

The AVA, the RSPCA Australia and Animals Australia maintained their position stating voyages during May to October presented too high a risk of heat stress and therefore supported a 6-month prohibition during this time. These groups did not believe the prohibition under option 2 will be enough to prevent adverse outcomes in high risk months.

Revision of the HSRA model

Submissions were broadly supportive of some form of revised HSRA model, however there was no consensus among stakeholders on the appropriate risk settings for the revised HSRA or the validity of the research underpinning the HSRA final review.

In particular, Animals Australia, the AVA, the RSPCA Australia, Vets Against Live Export (VALE) and the DPIRD supported using a revised HSRA based on HSTs, in accordance with the McCarthy and HSRA Reviews' recommendations. The RSPCA Australia acknowledged the diverse opinions surrounding the HSRA but states the panel were a group of independent experts appointed 'to provide independent advice so that the regulator can make informed judgements in the face of contradictory stakeholder and community positions'.

In contrast, industry groups including ALEC and LiveCorp were critical of the science around the HST distribution and did not support the panel's recommended revised HSRA model based on HSTs. ALEC stated that the HST distribution has not been adequately tested, the science surrounding development of HSTs was 'based on one small academic study' with a 'statistically insignificant sample size' and that the 'HSTs were set without consideration of duration or respite' from heat stress and that they are 'not implementable or appropriate'. LiveCorp does not support use of a HSRA model based on HSTs, stating the 'HST distribution [in HotStuff] has been dormant, never used and never tested'. LiveCorp also criticises the application of excessive

conservatism by the panel in determining appropriate HSTs, saying it has resulted in a flawed process and that 'HSTs fail to reliably indicate poor welfare'.

As an alternative ALEC and LiveCorp proposed a revised HSRA model that incorporated animal welfare outcomes, however, they acknowledged that this approach requires more research and remains a long way from practical implementation. There is a lack of consensus on the use of animal welfare indicators. Industry has commissioned research to support objective animal welfare indicators, however, it is unclear what the outcomes of this research will be and when usable objective measures will be available.

The AVA, the RSPCA Australia, VALE and Animals Australia supported an alternative approach where a revised HSRA model was introduced in parallel with a prohibition to offer increased assurance that sheep would not be exposed to excess heat. Under this approach the trade would be prohibited during the hottest months and the shoulder periods would be governed by a revised HSRA.

Alternative options

Almost one quarter of submissions to the draft RIS stated their first preference was for a total ban on live animal exports. Many of these submissions acknowledged the proposal may not be in line with government policy, so as a second preference, supported adoption of other prohibition periods, such as a 6-month prohibition for the Northern Hemisphere summer months from May to October, inclusive.

Animals Australia's proposed alternative included a prohibition for the entire Northern Hemisphere summer (from May to October inclusive), a revised HSRA model based on HSTs and an increased space allowance for sheep using an allometric k-value of 0.047.

The inclusion of a 'status quo' option of no prohibition

The public consultation process showed limited support for the status quo, with 3 of 21 submissions (14.4%) expressing any support for this approach as their first preference.

Many submissions were critical of the inclusion of this option in the draft RIS.

Diurnal variation

In their submission to the draft RIS, the AVA stated concern that 'on live export ships, there is little diurnal variation in WBT below decks where animals are housed'. This view was informed by a Maunsell Australia (2004) report which presented temperature data from 1 voyage in June-July 2004.

The department has analysed the environmental data logger records from 3 voyages to Middle East destinations during the Northern Hemisphere summer 2019 (May, September and October voyages). Records showed an average diurnal variation of between 5 to 6°C WBT for most vessel decks with variations being as high as 11.8°C WBT and as low as 1.8°C WBT. The lowest levels of diurnal variation were recorded at the equator.

The department is continuing to monitor environmental data on voyages to, or through, the Middle East during the Northern Hemisphere summer.

Ability to review policy

Many industry groups requested that new regulations be flexible, pending revision of the HSRA or new technological developments. For example, the LERG declared that 'on-going research into heat stress management and the availability of new science and technology could provide better outcomes and LERG supports the incorporation of new developments after a comprehensive review in 2021'.

Sheep Producers Australia also commented on the ability for the length of any prohibition period and destination port timings to be reconsidered in the future in light of advances in technology and industry practices. The NFF supports ongoing research into improving onboard conditions and welfare outcomes, noting that such efforts could support a longer shipping window to ports in the Middle East in the future.

ALEC echoed other submitters welcoming future reviews of policy in light of new science and technology that could provide valid alternatives to the proposed options. ALEC believes 'consideration should be given to applying a sunset clause to any regulatory changes resulting from this RIS process'.

Loss of market and reputational effects

Industry groups voiced their concern that the loss of market share caused by a prohibition could result in complete loss of the Middle East market, noting this was especially a risk with longer prohibition periods. The PGA stated that longer prohibitions force importers to source sheep from other countries. Some producers stated their concern that prohibitions jeopardise Australia's reputation with overseas live trade markets by making us unreliable suppliers.

The NFF and SPA stated concerns that changes to regulation of the live sheep export trade may have implications for other livestock producers, causing flow-on effects to the live cattle export industry. The SPA stated there was a perceived strong link between Australia's good reputation in providing high quality live animals and international acceptance of our carcase and boxed meat trade.

Another industry group stated concern that a market closure in live sheep may even extend to other non-agricultural products such as pigments and chemicals as Australia could be viewed as no longer a reliable supplier.

Capacity of domestic processing facilities

Consultation showed there was general scepticism by industry that Western Australian meat processing facilities could cope with the increased turn-off that would occur as a result of a prolonged prohibition. SPA suggested that local slaughter capacity could not cope with increased numbers of sheep and that many would need to be trucked to South Australia for slaughter, which would further reduce farm gate return.

Livestock Shipping Services, who owns meat processing plants in Western Australia, was sceptical of the department's estimate that the spare processing capacity in Western Australia is around 2 million head per year. Livestock Shipping Services agreed that although there is some extra capacity for domestic processing during Australian winter months, industry would not meet demand during spring and summer.

WA flock numbers and survival of the WA sheep industry

SPA declares 'the live trade has allowed a sustained business model to exist in sheep and cropping operations in Western Australia and South Australia for many years. Increases in regulation weaken the case for keeping sheep in that equation, which works against efforts to increase flock numbers to support the infrastructure required to keep an efficient supply chains for the sheep industry nationwide'.

Other industry groups state concern that increased regulation places too much burden on the sheep industry and could force producers to exit the business, leading to a collapse of the WA sheep industry.

Certainty for the industry

Industry has repeatedly called for the department to offer certainty on regulatory conditions for exporters, producers and international trading partners, to allow forward planning.

The AVA supports a defined period of prohibition, to give the community and industry certainty.

Limitations of a prohibition

Some industry groups remarked that prohibitions are a 'blunt approach', with ALEC stating a prohibition would 'lack the flexibility to incentivise investment in capability and technology which could lead to further improved animal welfare outcomes and commercial outcomes'. During feedback, the department learnt that industry supports a risk-based approach to regulation, based on animal welfare more than one based on mortality. A risk-based approach would require industry to develop tools or mechanisms to meet the new regulatory outcome of preventing heat stress rather than heat-related mortality.

Development of new technologies

Many industry groups identify that new science and new technology could provide valid alternatives to the proposed options presented in the RIS.

SPA notes that future technology may change onboard conditions to allow a longer shipping window and SPA supports research which may allow the opening up of the current timeframes for shipments to certain destinations.

LiveCorp states that the industry is seeking to validate new technology which may, in the future, address the heat risk challenges.

ALEC would welcome a sunset clause to any regulatory changes resulting from the RIS process. It argues that this would allow for introduction of any new, validated technologies and solutions based on robust welfare science.

While the department recognises there is ongoing research in the area of heat stress management, it is unclear if, or when, new approaches may become implementable. In the future, potential introduction of new technologies, new genetics, a revised HSRA model or developments in animal welfare indicator research may lead to an approach that achieves the same or greater outcomes with regards to heat stress management in sheep.

Assumptions and unresolved issues

Assessing the impact of the revised HSRA model under option 3 presented challenges. A revised model does not yet exist, therefore determining its actual impact is a modelled analysis only. Industry research papers provided some guidance for the department when determining stocking densities using HSTs. The department's modelling was corroborated by LiveCorp's own impact analysis of a revised HSRA model based on HSTs.

Stakeholders and the department both noted there was limited validated science surrounding heat stress in exported sheep. The HSRA review provided some direction but highlighted that validated science was not yet available on issues such as:

- influence of diurnal and day-to-day variations in deck WBT
- effect of duration of exposure
- effect of respite.

The HSRA panel identified these areas for further development, stating that new research into the field of heat stress science may influence future approaches to the management of heat stress.

Although the majority of submissions supported a prohibition, consultation also indicated a wide range of conflicting views on the issue of live sheep exports and what constituted good animal welfare more generally. The ability to quantify progressive increases in animal welfare benefits under each proposed option posed significant challenges for the department. For the final RIS, the department resolved to balance improved animal welfare outcomes with the impact to industry and its sustainability.

Economic analysis on supply chain impacts provided to the department in submissions varied significantly depending on the views and perspectives of the submitter. The modelling studies funded by animal welfare groups tend to conclude that the economic impacts of ending live sheep exports would be relatively small because producers and meat processors can readily adjust to alternative markets. Alternatively, studies funded by industry tend to present that producers have few viable alternatives to live exports and that restricting the trade would have a significant impact on prices and farm incomes.

Public consultation elicited a wide range of feedback and opinions on preferred options but the department noted that submissions did not provide detailed, quantitative analysis of the impact of options.

Based on the best available science, and feedback from consultation processes, the department identified option 2 as demonstrating the highest net benefit and is therefore the preferred option recommended by the department. The department acknowledges there was limited detailed quantitative data provided to the department during public consultation. This limited the quantitative analysis able to be undertaken by the department in this RIS. From the data that was provided during consultation, it was determined that Option 2 balances improvements to animal welfare while retaining a viable live sheep export industry.

Stakeholder meetings

Since the start of consultation in May 2019, the department met with stakeholders by face-to-face meetings, teleconferences, conferences and consultation tours in relation to the RIS process.

Consultation on the Middle East sheep exports policy options discussion paper

On 27 September 2019, the department released the Middle East sheep exports policy options discussion paper (discussion paper) on the department's Have Your Say webpage as a precursor to the formal written submission process on the draft RIS. The discussion paper proposed 4 policy options:

1) Three month prohibition—Conditions under the Middle East Order apply for the northern summer months and industry continue to use the existing HSRA model or agreed animal welfare indicators.
2) Apply the 2019 prohibition period—Conditions under the Middle East Order apply for the northern summer months. The department would remove the requirement for a HSRA on live sheep export voyages to, or through, the Middle East.
3) Adopt a revised HSRA model with risk settings based on heat stress thresholds or agreed animal welfare indicators.
4) No prohibition—Live sheep exports to, or through, the Middle East would be permitted 12 months of the year. Conditions under the Middle East Order apply for the northern summer months and industry continue to use the existing HSRA model.

The discussion paper also invited comment on:

- the benefits and impacts of each option on individuals, businesses, organisations and the community
- whether there was an alternative policy option that would both support a sustainable live sheep export trade and meet the high animal welfare standards expected by the Australian public
- suggestions for data that should be collected to support ongoing analysis and improvements to the regulation of live export voyages to the Middle East.

Consultation on the discussion paper concluded on 4 November 2019 and the department received 66 submissions.

Submissions to the Middle East sheep exports policy options discussion paper

Submissions were from a range of stakeholders including industry representatives, animal welfare non-government organisations and members of the public. Of the 66 submissions, 63 supported the implementation of a prohibition period for sheep exports. Three submissions supported the option for no prohibition period. These 3 submissions provided some information about the importance of allowing trade for the entire 12 months of the year but did not address the issue of managing heat stress in sheep.

The majority of submissions to the discussion paper supported some form of prohibition, with support coming from industry and welfare groups alike. There was varied opinion on the most appropriate duration for a prohibition. Some welfare groups and members of the public expressed the view that positive animal welfare can only be safeguarded by a total ban of live sheep exports or a prohibition during the entire Northern Hemisphere summer, from May to October inclusive. A small number of producers supported no prohibition.

The majority of submissions were supportive of some form of revised HSRA model based on animal welfare rather than mortality, and many submissions called for a revised HSRA model to be introduced to supplement a prohibition period.

Producers and industry groups generally stated that Australia's livestock export industry is already highly regulated, with Australia demonstrating the highest animal welfare export standards of any country that exports livestock.

Industry participants such as transporters, feed millers and AAVs have expressed concern for the viability of their business if live exports were to be prohibited for extended periods or banned altogether. The major topics raised through the Middle East sheep exports policy options discussion paper consultation included, but are not limited to:

Revision of the HSRA model

- 58% of submissions supported some form of revised HSRA model.
- The AVA, the DPIRD and welfare groups such as Sentient, Animals Australia and the RSPCA Australia supported using a revised HSRA based on HSTs, in accordance with the panel's recommendations.
- Industry groups such as ALEC and LiveCorp did not support the panel's recommended revised HSRA model, stating that the HST distribution has not been adequately tested and that HSTs fail to reliably indicate poor welfare. As an alternative option ALEC and LiveCorp proposed a revised HSRA model that incorporated objective animal welfare indicators, however, they acknowledged this approach requires more research and remains a long way from practical implementation.

Alternative total live sheep trade prohibition and or phase-out option

- 60% of submissions to the discussion paper stated their first preference was for a total ban on live animal exports. Many of these submissions acknowledged this proposal may not be in line with government policy, so, as a second preference, supported adopting other prohibition periods proposed under options 2 and 3.

Inclusion of a 'status quo' option of no prohibition

- The public consultation process showed limited support for the status quo, with only 3 submissions (4.5%) showing any degree of support for this approach.
- Many submissions were critical of the inclusion of this option in the discussion paper. The AVA did not support this option as it represented an unacceptably high risk to sheep welfare. The RSPCA Australia stated concern that adopting the 'status quo', would undermine many of the improvements made over the last 18 months.

Varying length of time of a prohibition

- Much of the discussion in submissions focused on the most appropriate duration for a prohibition. The majority of submissions (91%) supported some form of prohibition, with support coming from industry groups as well as welfare groups. Generally, welfare groups were in favour of longer prohibition periods.

Animal welfare indicators

- Submissions from industry and welfare groups showed broad support for moving to a HSRA based on animal welfare measures. LiveCorp is currently undertaking a research project to develop and trial animal welfare indicators to inform a revised HSRA model. The department understands that significant research is still required before this approach can be used as an effective and appropriate regulatory measure.

Alternative interim measures proposed

- Industry groups including ALEC, LiveCorp and SPA proposed a prohibition as an interim measure only, pending revision of the HSRA model or an alternative solution.

Future review of policy

- Some industry groups including SPA identified the need for ongoing refinement of the HSRA model as additional science and data analysis becomes available. SPA stated the need for review of export conditions as data sets for animal welfare indicators are developed and as new technology becomes available.

Related consultations

Since early 2018, the department has undertaken a number of public consultation processes for reviews relating to the issue of live sheep exports to the Middle East during the Northern Hemisphere summer. Submissions to these consultation processes have contributed to the development of the RIS. Consultation has included, but is not limited to, proposed interim measures for the Northern Hemisphere summer 2019 (May to August only), and proposed interim measures for the Northern Hemisphere summer 2019 (September and October), the HSRA Review, the Moss Review, the McCarthy Review, Livestock Export Animal Welfare Advisory Group meetings, and other stakeholder meetings. A summary of previous related formal written submission processes is contained in Table J1.

Table J1 Previous related formal written submission processes

Consultation	Opening date	Closing date	Number of submissions received
September and October 2019 prohibition extension consultation	12 July 2019	22 July 2019	220
Interim measures for the Northern Hemisphere summer 2019 consultation	15 March 2019	21 March 2019	11
HSRA Review draft report	13 December 2018	1 March 2019	315
HSRA Review issues paper	13 September 2018	19 October 2018	19
Moss Review	16 May 2018	27 September 2018	43

Consultation	Opening date	Closing date	Number of submissions received
McCarthy Review	10 April 2018	11 May 2018	52

Glossary

Term	Definition
allometry	The relationship of body size to shape, anatomy, physiology and behaviour.
Australian Government Accredited Veterinarian	A veterinarian who is accredited under relevant Commonwealth legislation to carry out duties in relation to the export of livestock.
Awassi Express	The livestock export vessel on which 2400 sheep perished due to heat stress whilst en route to the Middle East in August 2017.
Awassi incident	In April 2018, video footage obtained by Animals Australia showed Australian sheep in severe heat stress while being transported to the Middle East on 5 consecutive voyages on the MV *Awassi Express*, with most footage taken during a voyage in August 2017.
diurnal variation	The difference between the warmest part of the day and the coolest part of the day.
heat load	Exposure of livestock to hot environmental conditions likely to require physiological changes to allow them to maintain homeostatic body temperature.
heat stress	Excessive heat load.
homeostasis	The state of steady internal conditions maintained by living things.
HotStuff version 4	Software program for the assessment of heat stress risk for live export voyages.
Independent Observer	An authorised officer who is placed on a live-stock vessel to monitor, review or audit the activities of AAVs and exporters. IOs do not take an active role in animal management, their primary role is to observe and record the activities in an exporter's export plan. The IO provides a report at the end of the journey which is published on the department's website.
k-value	k-values are used in allometric calculations for pen space allowances as a determinant of the threshold for all sheep to be able to either stand, sit or lie down at the same time.
Middle East Order	Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East) Order 2018. This is legislation that applies to voyages of sheep to, or through, the Middle East departing between the months of May to October.
McCarthy Review	Independent review into conditions for sheep being transported to the Middle East during the Northern Hemisphere summer published May 2018.
mortality limit	The WBT at which an animal will die.
Northern Hemisphere summer	Refers to the months of May to October, inclusive.
Northern Winter Order	Australian Meat and Live-stock Industry (Export of Sheep by Sea to Middle East – Northern Winter) Order 2018. This is legislation that applies to voyages of sheep to, or through, the Middle East departing between the months of November to April.

Term	Definition
Office of Best Practice Regulation	The body that is responsible for governance of the Australian Government's Regulatory Impact Analysis work, which summarises the expected outcomes of regulatory initiatives.
pad	A mixture of compacted manure and bedding materials that form the substrate covering the floor of animal pens.
panting score	Characterises the panting of livestock; considers more than respiratory rate (for example open mouth, protruding tongue).
pastoral	Land used for the keeping or grazing of sheep or cattle
pen air turnover	A pen air turnover is a vessel's ventilation flow rate divided by the pen area ($m^3/hr/m^2$)
pen space allowance	The pen area (m^2/head) provided to livestock on a live export vessel.
percentile	Denotes thresholds or boundary values in frequency distributions. Thus the 5th percentile is that value which marks off the lowest 5% of the observations from the rest and the 95th percentile exceeds all but 5% of the values.
registered premises	Premises registered for holding and assembling livestock for export in accordance with the Export Control (Animals) Order 2004.
reportable level	The mortality level of a voyage at which exporters are required to notify the department, as soon as possible. For live sheep exports to, or through, the Middle East, this level is 1%.
social license	Exists when a project has broad social acceptance or ongoing approval in the community.
stocking density	Number of livestock per unit area in a high-density housing situation.
stocking rate	Number of livestock per unit area in a paddock or a whole farm.
stores	Livestock sold for finishing
summer months	Referring to Northern Hemisphere: from May to October, inclusive.
the department	Department of Agriculture, Water and the Environment.
the panel	Heat Stress Risk Assessment Review Technical Reference Panel.
thermoregulation	Process that allows the body to maintain its core internal temperature within a normal range.
Wet bulb temperature	The WBT is the temperature read by a thermometer covered in a water-soaked cloth or by equivalent electronic devices.
WBT welfare threshold	The WBT above which there will be a challenge to the thermal homeostasis of an animal.
winter months	Referring to Northern Hemisphere: November to April, inclusive.

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